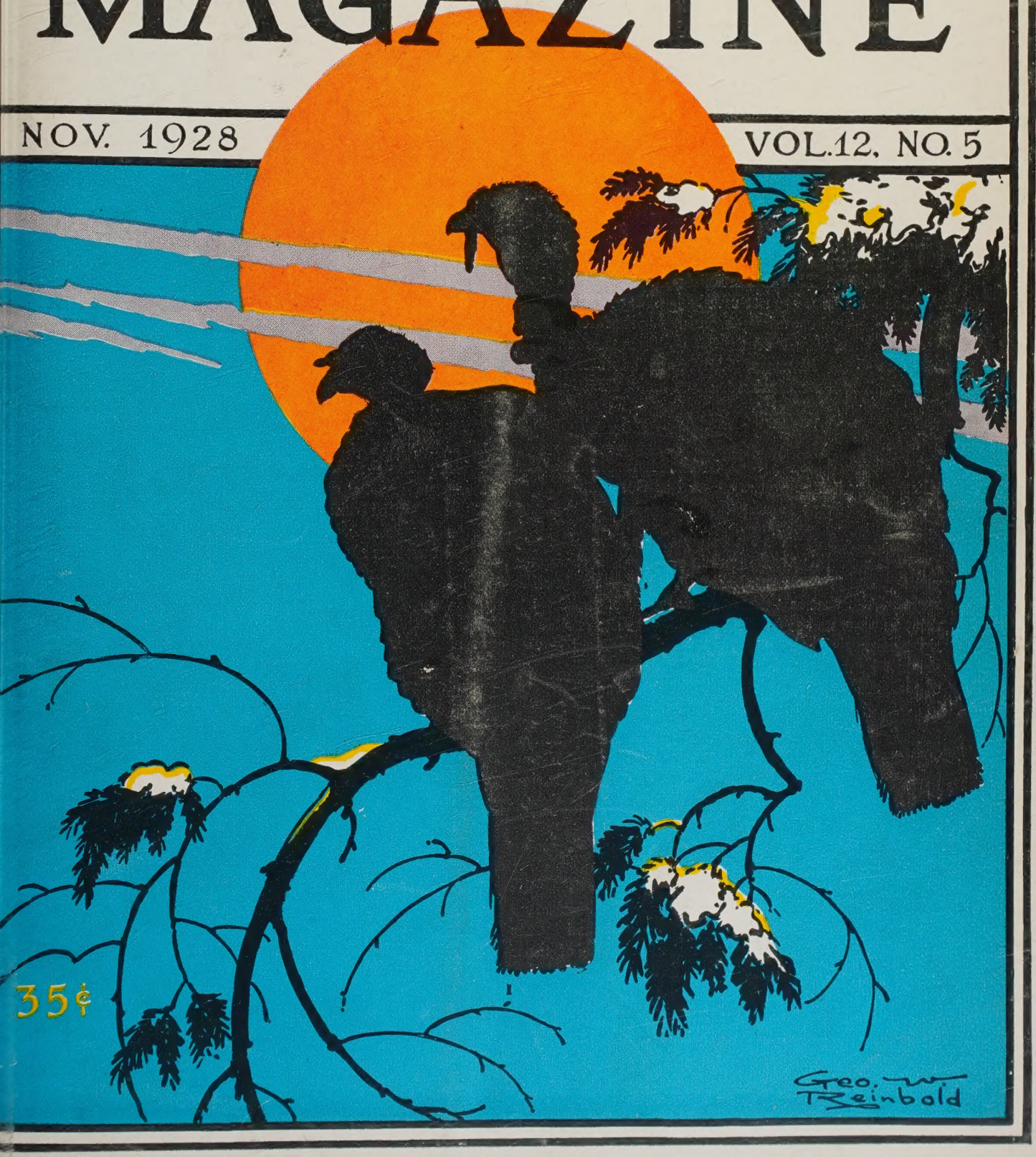
NATURE MAGAZINE

NOV. 1928 VOL. 12, NO. 5



Officers

ARTHUR NEWTON PACK
Princeton, N. J., *President*

CHARLES LATHROP PACK
Lakewood, N. J., *Chairman Board of Directors*

PERCIVAL S. RIDSDALE
Washington, D. C., *Secy-Treas.*

RICHARD W. WESTWOOD
Washington, D. C., *Asst. Secy.*

HARRY E. RADCLIFFE
Washington, D. C., *Bus. Mgr.*

The American Nature Association

Associates

WILLIAM L. FINLEY
Jennings Lodge, Ore.
Director, Wild Life Conservation

DR. E. LAURENCE PALMER
Cornell University, New York
Director, Nature Education

ANNA BOTSFORD COMSTOCK
Ithaca, N. Y.
Assoc. Director, Nature Education

RUSSELL T. EDWARDS
Washington, D. C.
Director, Educational Publicity

Organized to Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

The American Nature Association seeks to find for Nature Study an essential place in every School and in every American Home. It is working for Forest and Wild Life Protection along sane, economic lines. It believes that clean, healthful Out-of-Door Recreation is the key to Good Citizenship

IN ANOTHER part of this issue is a brief article by Mrs. Clare B. Jones of the Garden Club of Georgia which will be of interest to many active in Garden Club work. We are not informed as to how extensive the formation of State Garden Clubs has been, but we feel that the action taken in Georgia is a distinctly valuable and progressive one since much can be accomplished through a state-wide organization that local and separated groups cannot achieve. This is particularly important because the Garden Clubs are not merely limiting themselves to flower growing but actively working for roadside beautification, elimination of unsightly billboards and for Outdoor Good Manners. We should be interested to hear of other State Garden Club organizations.

* * *

In this connection we are interested to record the action taken by the State Highway Board of Georgia in adopting the following resolution:

"Resolved, That it is the policy of the State Highway Board of Georgia to encourage in every practical way the preservation of the natural beauty along Georgia's highways and to that end that all employees of the department be requested as far as practicable, to keep the entire right-of-way cleared off and in neat condition and to prevent the unnecessary cutting of trees and disfiguration of the land upon the side of the right-of-way.

"Resolved further, that all advertising signs be prohibited on the right-of-way and that in every practical way the beautification of the roadway and right-of-way be encouraged by the planting of trees and the clearing of the right-of-way of all objectionable and unsightly objects".

* * *

In the September issue of *Nature Magazine* there was an advance statement of the program of the *Nature and Science Education Review,* to be published by the American Nature Association for the benefit of those engaged in the work of Nature Education. All those interested were invited to send for a copy of the first issue. This invitation is still open, although the first issue of the new publication will be out about the time that this issue of *Nature Magazine* appears.

* * *

The beautiful book assembling within two covers 168 of the Horsfall paintings has been adequately announced in *Nature Magazine.* We have been delighted with the reception accorded this contribution to Nature Education. Those knowing the cost of color printing will appreciate what it means to present this number of subjects in the form they have been given for one dollar.

* * *

Now that the California Issue of *Nature Magazine* has reached our members and they have had opportunity to read it, we should be interested in any expressions of opinion as to the value of geographically designed numbers of this sort appearing at not too frequent intervals. The Editors, of course, welcome opinions about any issue of the magazine but are specially interested in the sectional numbers since two are being planned for 1929.

* * *

The article on "Making and Maintaining a Lawn" has been made into an attractive bulletin and may be had by requesting Bulletin Number 40. It is available to members on request. No member having a lawn problem should fail to have this bulletin and its companion, "Have a Weedless Lawn".

* * *

There are still available additional copies of the Outdoor Good Manners poster. This is particularly useful for posting on club or school bulletin boards.

* * *

A few copies remain of the special bulletin, reprinted with color illustrations, entitled "A Plea for Our Hawks", as well as the bulletin "Our Disappearing Fur-Bearers". These are available at five cents each in lots not less than ten. This is less than the cost of printing and mailing.

NATURE MAGAZINE is published monthly by the American Nature Association
Entered as second-class matter May 31, 1927, at the post office at Washington, D. C. Additional entry at Greenwich, Conn.
Publication and Editorial Offices, 1214 16th Street, N. W., Washington, D. C.
Additional Offices of Publication, Greenwich, Conn.
Chicago Advertising Office, 25 North Dearborn St.
New York Advertising Office, 171 Madison Avenue.
Copyright, 1928, by American Nature Association
Title Registered U. S. Patent Office

A NEW WAY TO GIVE FOR CHRISTMAS

Live Trees Living Gifts

INEXPENSIVE AND UNUSUAL

RAINBOW PLANTS

(Desert Ferns)

Fresh, glistening green plants. Rainbow Plants live forever. A rare novelty that will give you a dinner or luncheon table decoration at short notice. Four plants, as shown in the picture, make a display about 10 inches in diameter.

EACH DISPLAY—$2.00 (consists of 4 plants neatly packed together in a special mailing carton). SIX DISPLAYS—$11.00. *(Please add 10 cents per display for parcel post.)*

SILVER PLANT

(Dracaena sanderiana)

The clear green leaves are outlined with silver-green stripes. In a warm room, given moisture and light, its colors become brilliant.

Averages 8 to 10 inches in beautiful artcraft pot. SIX PLANTS—individually boxed and potted, ready for six friends—$5.75 for all. ONE DOZEN $10.50. *(Please add 10 cents per plant for parcel post.)*

PARADISE PALM

(Kentia forsteriana)

The exquisite palm symbolizes ease of living, luxury. It calmly builds up fresh green and ever taller fans in a mysterious way.

Averages 14 to 20 inches in green artcraft pot when delivered. EACH PLANT $2.00. SIX PLANTS $11.00. *(Please add 25 cents per plant for parcels post or express charges.)*

FERN PINE

(Podocarpus elongatus)

This is perhaps the only outdoor tree ever developed by horticulture that is perfect for the house. It will flourish, putting on fresh growth, even in a dark hallway. If you haven't any place to grow trees outdoors grow Fern Pines indoors!

Average height 8 to 10 inches in green artcraft pot when delivered. SIX TREES—individually boxed and potted ready for six friends—$5.75 for all. ONE DOZEN $10.50. *(Please add 10 cents per tree for postage.)*

RUBBER PLANT

(Ficus elasticus)

One of the most valuable of trees for indoor growing. If given sunshine and showers at intervals, it will live years and make a fine lasting decoration for sun porch or hallway.

Averages 14 to 20 inches in green artcraft pot when delivered. ONE PLANT: $3.95. TWO PLANTS: $7.50. *(Please add 30 cents per plant to cover parcel post or express charges.)*

Living Christmas Trees

3 Sizes!

1. **Greeting Tree:** A unique alternative to Christmas Cards. It expresses the spirit of Christmas exactly. A charming miniature (6 to 8 inches when delivered) that will grow into a large tree. Complete in artcraft pot. SIX TREES $5.75; ONE DOZEN $10.50. ONE HUNDRED $75. *(Please add 10 cents per tree for parcels post.)*

2. **Table Tree:** A shapely spruce (illustrated above) standing 12 to 15 inches in a pretty artcraft pot, can be decorated in any number of ways. ONE TREE $2.; SIX TREES $11. *(Please add 20 cents per tree for parcels post.)*

3. **Living Christmas Tree:** Stands 20 to 30 inches including depth of red lacquered container. Handsome and valuable. ONE TREE $3.95; A PAIR OF TREES $7.50.

(If you prefer a fully prepaid shipment add 50 cents per tree for express charges east of Mississippi, $1 west of Mississippi.)

All the trees and plants offered here are covered by **GUILD LIFE INSURANCE** and any one will be replaced without cost within a year if it does not flourish.

THE LIVING TREE GUILD, Dept. 611
468—4th Ave., New York, N. Y.

Please send the plants as follows any time between December 5th and 20th unless I call for special date:

CHECK ONE

☐ *Fully prepaid:* Enclose with this order amount on price list and add postage or express charges as indicated

☐ C.O.D. If you do not remit with this order shipment will be made C.O.D.

STATE THE QUANTITY YOU DESIRE IN THE SPACE BEFORE EACH PLANT. If you prefer, our special mailing service will send your order to your individual friends on the date specified. In that case, enclose their names and addresses and your card to go in each package. You may select various plants in the same price group at the quantity cost for that group.

___Greeting Trees
___Table Trees
___Living Christmas Trees
___Rubber Plants
___Rainbow Plants
___Silver Plants
___Paradise Palms
___Fern Pines

Name.....

Address.....

The Gall in Us All

No, not the gall that prompts the neighbors to borrow your lawn-mower, but the vital body fluid that helps to run or ruin the human machine,—this is the gall discussed in the November issue of HYGEIA, The Health Magazine. An experienced physician tells about foods that cause gallbladder disease, how it may be detected and treated. An article you should read if you have the affliction or don't want to have it!

Cosmetics and the Skin

What's happening to the complexion of Lily, the American flapper, now that she gilds herself so lavishly with powder and paint? Read the opinion of a skin specialist in the November HYGEIA.

Are There Vitamins in Canned Foods?

Whether you eat in a cafeteria or in your own dining room, this article is pertinent to your health. It tells some little-known and surprising facts about canned vegetables.

Other Health Features

Read the November HYGEIA for these articles, too: *Care of the Invalid, Bitter Herbs, The Child Who Won't Drink Milk, Learning to Be Blind, Tuberculosis—And Why.* Here are health discussions free from fads, follies, and fallacies, for HYGEIA is published by the American Medical Association, the national organization of physicians. . . . HYGEIA'S regular subscription rate is $3.00 a year, but here is a special introductory price. Mail the coupon now!

6 Months for $1.00!

AMERICAN MEDICAL ASSOCIATION
535 N. Dearborn St., Chicago

Please send me HYGEIA for 6 months, beginning with the November number. I am enclosing $1.00 in payment.

☐ I should also like information on your rates for Christmas subscriptions.

Name .....

Address .....

NN

Garden Club of Georgia

By CLARE BOIFEUILLET JONES

All over the country women have awakened to the realization that the opportunity and necessity of beautifying the unsightly spots along the highways of the states is theirs, and they have nobly risen to the responsibility. They are interested, however, not only in the development of beauty on the highways and around the individual home, both in the city and the country, but in the conservation of that beauty with which the Master Artist so generously endowed this country. With the right to vote has come an aroused civic pride which demands improvement in the realm of beautification. Through the medium of the garden clubs, new ones of which are constantly forming, the best work to this end is being done.

The effectiveness, though, of the single garden club is necessarily limited. The garden clubs of Georgia realized this and so in order that the whole state might become enthused and benefited, a state garden club was organized in June of this year. In response to a call sent out by the Peachtree Garden Club of Atlanta, which club is a member of the Garden Club of America, representatives from the garden clubs over the state met in Atlanta and formed the Garden Club of Georgia, electing Mrs. Phinizy Calhoun, of Atlanta, president.

The president and one voting delegate from each garden club in the state were invited to attend the organization meeting.

The objects of the state club are: "To promote the love of gardening among amateurs through conference and correspondence; to protect the Georgia native trees, wild flowers and birds; to encourage civic planting and civic beauty". It urges and aids the formation of numerous small garden clubs in congenial sections of a city, believing that the smaller club of about twenty-five or thirty, which can conveniently meet in the homes, is more desirable than the large, unwieldy club. It advocates the planting of trees, shrubs, flowers indigenous to the locality in which they are to grow.

In addition to the officers, which comprise a president, first, second, and third vice-president, recording secretary, corresponding secretary, treasurer, there are standing committees, selected from different parts of the state, as are the officers, which are ready at all times to be of service to the member clubs. These include: conservation; billboards, one of the most important and which has an active man, Mr. J. B. Copps of Savannah as chairman; publicity; garden slides; beautification of roadsides; flower show; admissions; questionnaire.

Elementary Science

D. Appleton and Company have added Book Three to their new series appearing under the group title of *Elementary Science by Grades*. As was Book Two, it is written by Elizabeth K. Peeples and Ellis C. Persing and edited by Dr. Frank W. Ballou, head of the Washington, D. C., schools. The Look follows the fundamental ideas worked out in its predecessor, is beautifully illustrated in color and black and white. Once completed, these six grade readers will be a remarkably valuable set of texts.

NATURE ALMANAC

by ARTHUR NEWTON PACK
and PROF. E. LAWRENCE PALMER
(The first ever published)

Just what everyone interested in Nature Education, Nature Organizations, Nature Study, Nature Bibliography, etc., etc. needs for reference and for library.

312 pages handsomely bound

PRICE ONLY

$1.00 prepaid

A Handbook of Nature Education
A Nature Calendar for Every Month
A Nature Education Survey
A School Nature Outline
A Nature Bibliography
A Mine of Nature Information

Edition Limited—Order Now

American Nature Association
Washington, D. C.

Nature Magazine Bound Volumes

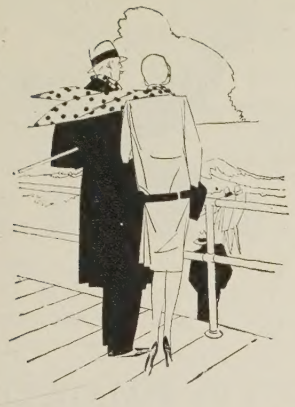
A wonderful book for homes and schools and libraries.

Over 400 pages of fascinating articles and beautiful pictures many in full color

Ten Volumes now ready
Price $3.00 each

Order from
American Nature Association
Washington, D. C.

REMEMBER YOUR FRIENDS
Secure your Christmas Cards from the American Nature Association.



"I *couldn't* be any more thankful"

WE'RE HERE for the holidays! I don't have to think about a turkey until I see it on the table! Everything will be done for me, just as I want it done. . . . It's lovely here now. Not a bit cold, but as pleasant and cheery as can be. A tremendous number of people are stopping over—they evidently come here year after year. We feel as though we'd been invited to a Thanksgiving reunion! . . . Some new friends want us to stroll the Boardwalk tonight, but I am a little tired, so we'll go to bed early. And after that, as Jack says—breakfast!

Thanksgiving reservations should be made some days before. A booklet, describing the hotels, will be sent at your request.

CHALFONTE-HADDON HALL

ATLANTIC CITY

American Plan

LEEDS AND LIPPINCOTT COMPANY

Although summer is generally regarded as "vacation time", the opportunities for interesting trips and cruises during the winter season are steadily increasing. It is only natural that the traveller should prefer to visit the more southerly resorts in the winter, and enjoy the change of climate provided. Another point to be considered is that many countries are so warm as to be disagreeable in the summer, while later in the year their climates are delightful—and the winter is the best time to visit them.

* * *

The number of passengers already booked for West Indies Cruises is astounding. And yet the popularity of these cruises is easily understood. The prices vary so as to meet all demands, from the short cruises on small boats to the four or six weeks' trips on luxurious steamers. The majority of such cruises are conducted on an All-Expense plan which includes shore excursions and guides at the ports visited. The life on shipboard is ideal, and every effort is made to make the cruises as enjoyable as they are restful for those desiring a real winter vacation.

* * *

Not very many years ago it was the prevailing opinion in America that one might more easily travel to the North or South Pole than to attempt a pleasure trip to South Africa. This idea has naturally undergone a radical change in the past decade, due to the ever increasing efficiency of steamship and railroad lines. We learn from the South African Tourist Bureau that, although the country is still sparsely inhabited, it ranks among the first in the fields of agriculture and mining. Johannesburg, the most important city in South Africa, was founded during the great gold rush of 1886, and has maintained its position ever since. Aside from its industries, the scenery and magnificent quantities of wild life lure visitors from all parts of the world. The temperature of the country, influenced by ocean currents, is widely varied, but extremes of hot or cold are not common. The bracing climate of the interior attracts many visitors from the undesirable winter conditions in Northern America and Europe. The Union Castle, White Star, Blue Funnel and several other lines maintain regular service to the principal harbors of South Africa.

* * *

Almost irresistible fascination is held in the literature arriving now from steamship and travel companies on Around-the-World Cruises! To live in utmost comfort on a luxurious liner, to sample every climate, and, above all, to have the joy of seeing all kinds of places and people; to visit not only Europe or India or Japan, but these three and many more. Could there

(*Continued on page 281*)

Where Nature Raged

—then smiled her loveliest!

MOUNTAINS pitted with huge craters and scarred with vast lava flows tell the story of Hawaii's fiery origin. But nowhere on earth has Nature compensated for her violence with more gentleness and beauty.

She has cooled those burning slopes with soft trade breezes — then covered them gorgeously with flowers, shrubs and trees. Along palm-fringed shores, she has planted coral gardens, as fairy-like playgrounds for her bewildering variety of ocean life. And over all, at night, she spreads the mystic ecstasy of her tropic moonlit nights.

See Hawaii's natural wonders

—on one of LASSCO'S restful, fascinating 20-day Specially Serviced Tours.

The tour includes the three day wonder trip to Hilo, where you visit the great pit of Kilauea volcano — with a chain of other craters nearby—the curious huge lava tubes—tree molds —giant fern forests and other marvels of Hawaii National Park.

These fascinating tours on the S. S. City of Honolulu, sailing Nov. 17, and Dec. 15, give you the opportunity to see Hawaii under ideal conditions. The cost—from $326—includes every necessary ship and shore expense, Los Angeles back to Los Angeles. All travel details handled by a LASSCO representative.

Write for Special Hawaii Tour Folder. For additional information and reservations, apply any authorized agent, or—

LASSCO

LOS ANGELES STEAMSHIP CO.

730 South Broadway, LOS ANGELES

NEW YORK
505 Fifth Ave.

SAN FRANCISCO
685 Market St.

CHICAGO
140 S. Dearborn

SAN DIEGO
217 E. Broadway

N 5-1

Nature Readers

and those who follow her in fancy as well as fact, will find many stories in

ST. NICHOLAS

that will please them. During the coming year, such writers and subjects as these will grace its pages:

Wild Things at Play *Archibald Rutledge*
The Wooly West *Charles J. Belden*
Sea Afire
Fishing for Steak and Eggs *Robert Dean Frisbie*
Cold Comfort *Donald and Louise Peattie*
A White Sovereign *Alexander Sprunt, Jr.*
The Chucklehead
The Quest of the Wilson Warbler *Samuel Scoville, Jr.*
Quills *G. Frederick Clarke*
Hollow Trees and What's in 'Em *Paul Belden*

The illustrators include Charles Livingston Bull, Herman Palmer, Mahlon Blaine and Louis Lundean

In addition to such treats as these, there will be found the widest variety of articles, short stories of distinction, and regular departments dealing with Science, Current Events, Stamps, and riddles and, also, a section written and illustrated by the boys and girls themselves—The St. Nicholas League.

If you have a son or daughter, niece or nephew, or young friend, whose pleasure and profit you have at heart, give him St. Nicholas for a year. You will find no investment yielding a higher return in satisfaction, both to the giver and the receiver.

Here is the way to a youngster's heart:

THE CENTURY CO. N-11
353 Fourth Avenue, New York, N. Y.
Send St. Nicholas for one year to

.....

.....

Send bill to me (or check herewith) $4 for one year; $6.50 for two years.

.....

.....

A SAMPLE COPY SENT ON REQUEST
Just send a postal-card

A Garden Club

A friend of Outdoor Good Manners and conservation is the Garden Club of Santa Barbara and Montecito, a member club of the Garden Club of America, and now twelve years old. It has one hundred and five members. While horticultural subjects are most frequently those discussed in the monthly meetings and lectures, the organization finds place in its program for the collection of specimens of exotic plants grown in Santa Barbara, thus helping the Natural History Museum, and cooperates with the parent Garden Club in its endeavors. Its president is Mrs. Lockwood DeForest, Jr.

San Diego Floral Group

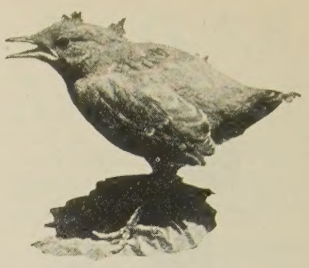
San Diego boasts of a unique organization, the San Diego Floral Association, which promotes two flower shows each year, conducts seasonal shows, maintains its own building in Balboa Park, and edits and publishes a sixteen page magazine, *California Garden,* which has circulation in twenty states and nine foreign countries without enlisting the aid of a single paid aide. It has existed for twenty-one years, and grown to a total membership of four hundred. The officers: Mrs. Mary A. Greer, President; Walter Birch, vice-president; B. L. Elliot, treasurer; Miss Winifred Sinclair, secretary; and Robert R. McLean, editor of the unusual magazine.

San Leandro

Across the Bay from San Francisco stands San Leandro, the "Cherry City", chosen by Luther Burbank during the Panama Pacific Exposition for his demonstration gardens, and noted throughout the Golden State for its Cherry Festival and its Dahlia Show. Nature has made an impression on its five thousand inhabitants. A garden club is being organized by the Chamber of Commerce in response to popular demand. The dahlia show is to be enlarged. A Burbank Memorial Garden, in which are flowers developed by the great naturalist and never announced, has been planted in one of the parks. And the latest development planned is the creation of parks and playgrounds in the arroyo which extends through the centre of the city.

The Oldest Floral Society

The California State Floral Society, chartered in 1888, and organized for "the purpose of stimulating public taste, making homes more beautiful, and magnifying the glory of the state", is the oldest floral society of the Golden State, and through lectures, exhibitions and public meetings has carried on Nature work. Chief of its achievements was the dahlia exhibited at the Panama Pacific International Exposition in 1915, which, it is claimed, caused the subsequent popularity of the dahlia in the state. Miss Annette Miley is president; Mrs. S. O. Scudder, vice president; Mrs. J. E. Lewis, secretary; Mrs. J. A. Scannavino, treasurer; and Mrs. Nell Darling, accountant. Luther Burbank was a member, and Mrs. Jemina Branin, whose knowledge of roses, iris collection and recent development of a new variety has made her famous, is among the charter members, Miss Alice Eastwood, well known botanist, is one of the regular club lecturers.



Young Water Ouzel Just Out of Nest

AMERICAN NATURE ASSOCIATION
Presents
GUY C. CALDWELL
Rocky Mountain Guide
in
Nature Programs De Luxe

Illustrated with hand painted slides, motion pictures and autochrome plates (direct color-photography)

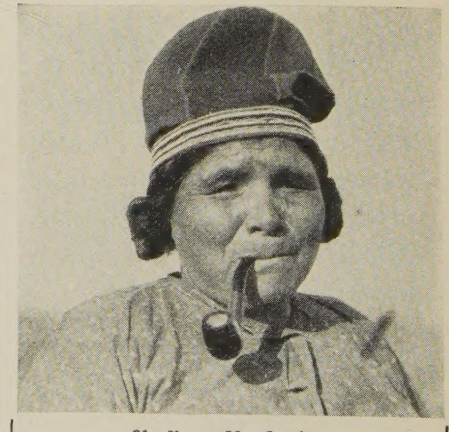
Subjects now available

1. Wild Life in the Rockies.
2. Bird Songs and Wild Flowers.
3. Trees—Beauty, care, conservation.
4. Autochrome Studies of the West.

A recital of bird and animal calls precedes the lectures—135 programs given last season. "The most beautiful program we have ever had" is the usual comment.

During the summer Mr. Caldwell conducts nature camps for boys and for women in the Rocky Mountain National Park, Colo. Ask for folders.

AMERICAN NATURE ASSOCIATION
15 Boudinot St. Princeton, N. J.



She Knows Her Smokes

CRUISING THE CANADIAN
LABRADOR
by
Howard H. Cleaves

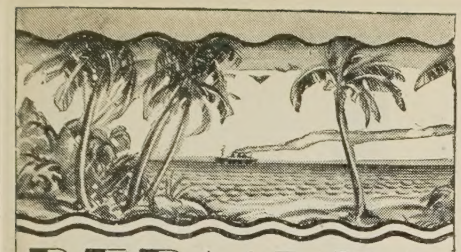
"You have heard of the *wild west*", writes Mr. Cleaves. "This is the *wild east*. The country has changed but little since Audubon's voyage in 1833. For more than three months we never slept on land. We encountered Indians, birds, seals, icebergs, fog, gales. There were no automobiles and I almost forgot how to dodge them. We gorged ourselves on native berries, salmon, herring, codfish, trout. Once I ate porpoise. It is tender and tasty."

This new lecture, illustrated by motion pictures and expertly hand-tinted slides, has proved an outstanding feature in the courses of clubs, schools and institutes during the present season.

Other lectures by Mr. Cleaves are:

Wild Life Adventures
Outdoors in the West
Birds of the Atlantic Coast

For illustrated folder write:
AMERICAN NATURE ASSOCIATION
15 Boudinot Street Princeton, N. J.



BERMUDA

It is Lovely now!

Bermuda with its wonderful climate beckons you *now*. Get another taste of summer in a delightful little foreign isle where everything is at its best for rest or for recreation.

Low Summer Rates Still Apply
8-day inclusive tours $102 (up)

Magnificent new quadruple-screw *M. S. "BERMUDA"*, (20,000 tons), unsurpassed in luxury by any ship afloat, alternates in semi-weekly service with twin-screw *S. S. "FORT VICTORIA"* (14,000 tons).

FURNESS BERMUDA LINE

34 Whitehall St., or uptown office, 565 Fifth Ave., New York, or any authorized agent.

THE CLIFT

SAN FRANCISCO
GEARY *at* TAYLOR ST.

One of San Francisco's finer hotels, distinguished in the refinement of its service, surrounded by downtown San Francisco

540 rooms with bath
Single, from $4
Double, from $6

EL MIRASOL
hotel and bungalows in the heart of SANTA BARBARA

DEL MONTE

MILITARY ACADEMY
A Select School for Boys
Adjacent to the World-Famous Del Monte Forests
Write for Catalog
MAJOR J. E. QUINN
Pacific Grove Box N California

(Continued from page 279)

be a more delightful method of gaining a complete education?

* * *

Hawaii! land of romance—of moonlit nights, of sun on golden sands, of soft music drifting from out the shadows! so our imagination tells us, and correctly. But it is harder to appreciate the practical advantages of the islands without personally experiencing them—the climate which scarcely varies from Christmas to July; the magnificent boulevards; the exquisite flowers and foliage for those trained to appreciate such things. The Los Angeles Steamship Company conducts All-Expense Tours (either three or five weeks long) which provide a scenic cruise among the islands as well as ample time to become acquainted, by means of motor tours, with the more beautiful sections.

* * *

The most remarkable—and the most pleasant—feature in which travel today differs from the travel of several years ago is in regard to the great reductions made in rates on both steamships and railroads. Practically anyone who really desires to do so can now see a great deal more of the world than that which lies in a small radius of his home. This year the White Star Line announces that two of their liners, the Adriatic and the Laurentic on their winter cruises to the Mediterranean, will carry Tourist Third Cabin passengers in addition to First Class. These 46-day Cruises visit the Mediterranean, the Holy Land and Egypt, and permit of shore excursions at the more prominent places. The rates are economical, and can be had either with or without the complete shore excursion program. Literature giving full details is available.

* * *

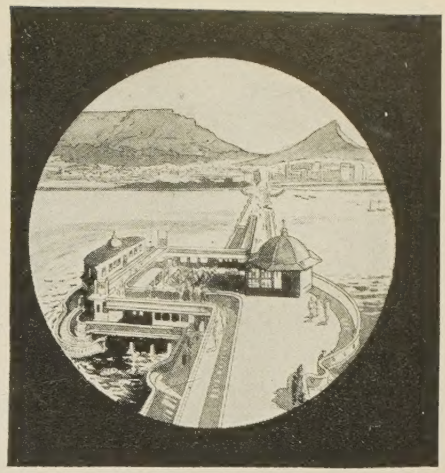
The world is so full of a number of things that very often we forget the opportunities lying at our very doors. This is particularly true when we stop to think of the charming winter resorts in the United States. California and Florida are, of course, world-known for their climates and for the sports, scenery and other advantages which they present. But they are not alone in this distinction. If one desires a warm climate it may be found in many of the southern and southwestern states, whereas for winter sports and scenery it is hard to surpass certain parts of New England and the other northern states.

* * *

Cuba, Jamaica, Porto Rico and others of the West Indies are now the mecca of many winter and spring tourists. They may be reached by several steamship lines. Visitors may have itineraries suggested by Nature Magazine Travel Department or make their own plans. The trips are inexpensive, and the accommodations first-class.

* * *

All readers of Nature Magazine planning pleasure trips by sea or by land are urged to take advantage of the opportunities offered by the Travel Department of Nature Magazine. This will not only give them full information but in many cases will be able to point out how money may be saved. All that is necessary for our readers to do is to write The Travel Department for advice.



From your first glimpse

of the glorious Cape in the pink glow of the morning sun, the golden floodlight of noon or the silver radiance of moonlight, until you bid a fond farewell to

SOUTH AFRICA

you will be charmed, mystified, and thrilled. It is a land of strange contrasts and inspiring places of romance, mystery and beauty. A land of invigorating climate wherein age renews its youth. When you have seen South Africa you have travelled and not until then.

Visit this
All Year Round
Travel Paradise

You travel comfortably, rest in modern hotels, enjoy up-to-date theatres, and also see things that can be found in no other place in the world.

Be sure to enjoy
The Great Diamond Mines
The Magic Cango Caves
Barbaric Bantu War Dances
Quaint Kaffir Kraals
Speedy, Preening Ostriches
Kruger Big Game Preserve

South Africa

Before you plan your next trip be sure to write for Booklet OD-2 *and fully illustrated travel literature to*

SOUTH AFRICAN TRAVEL BUREAU
Room 657
11 Broadway, New York City

The Bio-Sets

See the Wonders of the Microscopic World!

Complete biological sets, including "An Introduction to Slide Making", giving directions for the fascinating art of preparing microscopic specimens.

YOU WILL LIKE YOUR BIO-SET

New York Biological Supply Co.
34 Union Square, New York City.

Gentlemen: Enclosed find $..... for item checked below, money to be refunded if not found satisfactory.

- ☐ BIO-SET, complete $27.50
- ☐ BIO-SET, without microscope 10.00
- ☐ BIO-SET JUNIOR, complete 17.50
- ☐ BIO-SET JUNIOR, without microscope 7.75

Name.....

Street or R. F. D.....

City.....State.....

→ The BIO-SET with 250-power microscope

The BIO-SET JUNIOR ← with 100-power microscope

Special Christmas Cards

size 3¼ x 6 inches

made by our own artist for Nature Magazine Readers

THIS BEAUTIFUL CARD IN FULL COLORS

Red, Green, Yellow and Black

One dozen 25 cents, 50 for $1.00

Carry the Nature idea in your Christmas Cards

Order at once! ***These cards sold only by orders received direct***

NATURE MAGAZINE
1214 Sixteenth Street, Washington, D. C.

Enclosed find $.....for which send me.....Special Christmas Cards.

Name.....

Address.....

City.....*State*.....

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St. N. W.
Washington, D. C.

I desire membership in the American Nature Association, including NATURE MAGAZINE each month, and such bulletins and information as are given to members. I will remit $3.00 for one year's dues upon receipt of your bill.

90% of the annual dues is designated for subscription to the magazine

Name.....

Street.....

City.....

October

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St. N. W.
Washington, D. C.

I enclose $3.00 for membership in the American Nature Association for one year, including NATURE MAGAZINE each month, and such bulletins and information as are given to members.

90% of the annual dues is designated for subscription to the magazine

Name.....

Street.....

City.....

October

In Sacramento

Sacramento is the home of the camellia, whose aristocratic upbringing includes such nurses as Queen Elizabeth and King Philip of Spain, Napoleon and Josephine, and whose present sponsors in the valley are the members of the Sacramento County Garden Club. This organization conducts in February an annual show of the flowers of this long-lived plant, and generally promotes interest in it. Besides this activity, the club, a youngster born in 1926, has held bulb, sweet pea, mixed bouquets, dahlia and chrysanthemum shows, and taken a prominent part in the Sacramento County annual Spring Flower Show. Dr. Louise Heilbron is president, with H. O. Jenkins, vice president; Ashley Brown, treasurer, and Mrs. L. J. Hindsdale, secretary.

For the Children

San Diego seems to abound with Nature lovers and institutions devoted to Nature, but unique even there is the O'Rourke Zoological Institute in Balboa Park, which was dedicated by Mr. and Mrs. P. F. O'Rourke to the little children of San Diego, which maintains classes for the study of flora and fauna, and conducts field meetings and excursions to mountains, mesa, and seashore. It has organized a Boy Scout troop and a Junior Zoo Society, and radiocasts lectures by exploring naturalists and specialists in Nature work. One of its features is the giving of instruction in natural history to small children in their homes by volunteer teachers and members of the staff of the institute. Dr. W. H. Raymenton is director.

Again Santa Barbara

The Plans and Planting Branch of the Community Arts Association is one of those private organizations that play an important part in the beautification of the residential section of the city. The planning branch has had devised a series of model house plans which aided in architecturally improving the city, and has given yearly awards for better plans. The planting committee, under Miss Sophie Baylor, has supervised children's gardens and encouraged tree planting and wild flower planting on vacant lots, and planned the grounds of demonstration houses shown in Better Homes campaigns. It holds spring and autumn flower festivals and the annual Fruit and Flower Market, a remnant of Spanish days.

Contra Costa Hills

"To draw together in cordial co-operation persons interested in conserving, developing and enjoying the natural beauties of California", especially of that part known as the Contra Costa Hills, is the *raison d'être* of the Contra Costa Hills Club of Oakland, eight years old, and boasting of a membership of nearly four hundred. The club conducts a series of hikes in and around this scenic part of Alameda and Contra Costa counties, engages in various social affairs, aids in trail and road improvement and through its membership and publicity works for the cause of conservation generally. George H. Gihon is president, William Howden, vice-president, Miss Annie Hayward, secretary, and Harold French, publicity director.

Last Chance! *to plant Schling Quality Bulbs this Fall*

Order them *now!* Tip-Top bulbs at rock-bottom prices. For example—

100 Darwin Tulips $3.50

Choicest, first size bulbs, sure to bloom. Schling's special mixture of ten of the finest named varieties—*not the ordinary field grown mixture. A $6.00 value for $3.50 or, if you prefer, 50 bulbs for $2.00.*

SIX SPLENDID COLLECTIONS

100 **Single Early Tulips**—10 named varieties. Bloom April and May	$6.00
100 **Double Early Tulips**—in 10 named varieties	7.00
100 **Darwin Tulips**—in 10 named varieties. Immense flowers. May and June	4.50
100 **Cottage Tulips**—in 10 named varieties. Grandmother's tulips more beautiful than ever. May and June	5.00
100 **Breeder or Art Tulips**—5 named varieties. Wonderful shades of bronze, orange, buff and apricot. May and June	7.00
100 **Parrot or Orchid Tulips**—in 5 named varieties	6.00

Virginia Grown Daffodils and Narcissi for Naturalizing and Lawn Planting

100 for $8.50 1000 for $82.00

Airy and medium Trumpets, short cupped and lovely Poet's varieties, doubles and singles. All top size, mother bulbs.

ALSO THESE LOVELY HERALDS OF SPRING

500 Bulbs—a $22.50 value—$16

100 Crocus in 4 named varieties	$4.00
100 Scilla Sibirica (Blue Squills)	5.50
100 Giant Snowdrops	4.50
100 Blue Grape Hyacinths	4.50
100 Chionodoxa (Glory of the Snow)	4.00

Very Special **REGAL LILIES** ***at big Savings***

A LUCKY, last minute purchase enables us to offer for a short time only these first quality bulbs at a tremendous discount—Long, trumpet-shaped flowers, pearly white petals, throats shaded with pale yellow, in clusters on 3 to 4 ft. stems. Regularly $85.00 a 100 bulbs.

25 for $11.00 1 doz. for $6.00 50 for $20.00 100 for $39.00

Our new **Bulb Book**—lists of choicest bulbs for in or outdoor planting—free on request.

MAX SCHLING SEEDSMEN, INC. **Schling's Bulbs** 618 Madison Avenue North New York City

BIRD and ANIMAL PAINTINGS

by R. Bruce Horsfall

NOW AVAILABLE IN BOOK FORM

MANY readers of Nature Magazine have asked when the beautiful color pictures of birds, mammals, and insects that have been appearing in Nature Magazine would be available separate from the Magazine. The demand has been so insistent that this is the result:

A Beautifully-Bound and Printed Book Containing 168 Pictures in Full Colors and a Beautiful Frontispiece is Now Available.

Each picture is accompanied by concise description of the character and habits of the subject. Helpful suggestions are included to show the use of the book for school, camp, home and other educational purposes.

Despite the high cost of color plates and printing all this will cost the readers of Nature Magazine

ONLY ONE DOLLAR

AMERICAN NATURE ASSOCIATION
1214 Sixteenth Street, Washington, D. C.

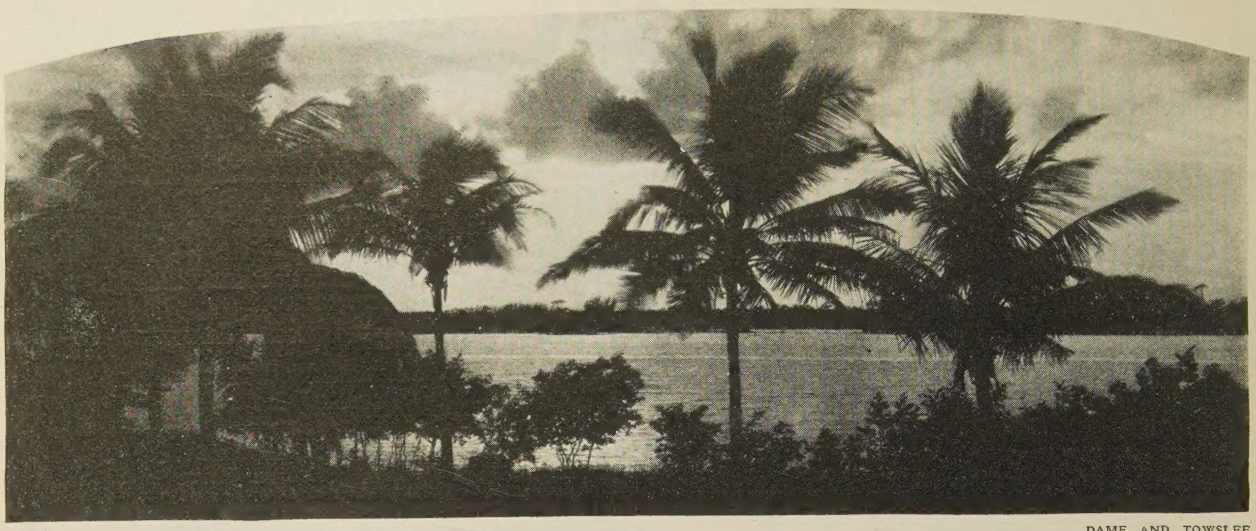
Enclosed please find $.....for.....books of R. Bruce Horsfall *Bird and Animal Paintings*

.....

.....

.....

(Please make address complete and legible)



DAME AND TOWSLEE

LAKE BOCA RATON AND OCEAN BOULEVARD, FLORIDA

NATURE MAGAZINE

PUBLISHED BY

THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

PERCIVAL S. RIDSDALE, *Managing Editor*
ARTHUR NEWTON PACK, *Associate Editor*
HARRY E. RADCLIFFE, *Business Manager*
RICHARD W. WESTWOOD, *Chief Editorial Staff*
PAUL F. HANNAH, *Assistant Editor*
R. BRUCE HORSFALL, *Artist*
GARNET W. JEX, *Assistant Artist*
EDWARD A. PREBLE, *Consulting Naturalist*

Scientific Consulting Board

DR. L. O. HOWARD, Senior Entomologist, U. S. Bur. of Entomology
DR. HARRY C. OBERHOLSER, Biologist, U. S. Biological Survey
HENRY O'MALLEY, U. S. Commissioner of Fisheries
C. W. GILMORE, Curator of Vertebrate Paleontology, U. S. National Museum
DR. WALDO L. SCHMITT, Curator of Marine Invertebrates, U. S. National Museum
VERNON BAILEY, Chief Field Naturalist, U. S. Biological Survey
DR. PAUL BARTSCH, Curator of Mollusks, U. S. National Museum
DR. EDGAR I. WHERRY, Wild Flower Preservation Society
T. GILBERT PEARSON, Nat. Assoc. of Audubon Societies
DR. WILLIAM M. MANN, Director, Nat. Zoological Park

$3.00 a Year

35c a copy

TABLE OF CONTENTS

November, 1928

HOME AQUARIUM FISH FROM TROPICAL WATERS *William M. Mann* 286
NATURE CALENDAR *E. Laurence Palmer* 287
THE LEAPERS OF WAIKELE *Stephen Haweis* 289
THE "HUNDRED THOUSAND" INSECT *Otto Wilson* 292
BOB-WHITES AT HOME *C. L. Bundy* 295
THE GROUND OWL *Joseph Dixon* 296
SHELLS OF OUR SOUTHERN BEACHES *William A. Murrill* 297
ECHOES OF A VANISHED HOST *Alexander Sprunt, Jr.* 301
THE SCHIPPERKE *Josephine Z. Rine* 303
LADY BIRD! LADY BIRD! *Gayle Pickwell* 304
GUPPIES IS GUPPIES *Eunice E. Myers* 305
GET OUT THE VOTE 306
PHOTOGRAPHIC CONTEST 308
LEWISIA AND CLARKIA *Leslie L. Haskin* 309
RARE FUR SEALS REDISCOVERED *George H. White* 310
PLANT OF PARADOXES *Alexander F. Skutch* 311
THE TIGER BITTERN *Harry C. Oberholser* 315
TAMING NATIVE WILD SHRUBS *Albert A. Hansen* 316
HINTS AND HELPS FOR HOME AND GARDEN *Harry R. O'Brien* 320
TURTLES OF GALAPAGOS *Doris M. Cochran* 322
NATURE'S OWN WEATHER BUREAU *Charles Fitzhugh Talman* 325
WATCH NOVEMBER'S SKIES *Isabel M. Lewis* 329
NATURE EDUCATION *E. Laurence Palmer* 331
A GIANT FOSSIL FISH *C. W. Gilmore* 332

Nature Magazine, past and present, is indexed in the Reader's Guide in your library.

NATURE MAGAZINE is published monthly by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D.C. Additional entry at Greenwich, Conn.

Subscribing Membership Blank will be found in the back pages of the magazine.

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D. C. Additional Offices of Publication, Greenwich, Conn.

ADVERTISING OFFICES

New York—171 Madison Ave.
Chicago—Mather Tower Bldg.
San Francisco—Hunter-Dulin Bldg.
Los Angeles—Lincoln Bldg.
Seattle—Henry Bldg.
Atlanta—Grant Bldg.

Copyright, 1928, by American Nature Association

Title Registered U. S. Patent Office

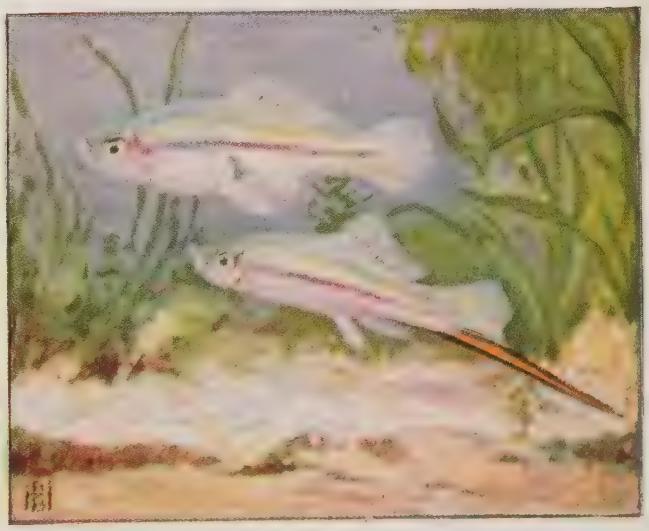
ANGEL FISH—*Pterophyllum scalare*

PARADISE FISH—*Macropodus viridi-auratus*

CHARACIDAE—*Pristella riddlei*

CYPRINIDAE—*Rasbora heteramorpha*

FIGHTING FISH—*Betta splendens*



SWORDTAIL—*Xiphophorus helleri*

HOME AQUARIUM FISHES
FROM TROPIC WATERS

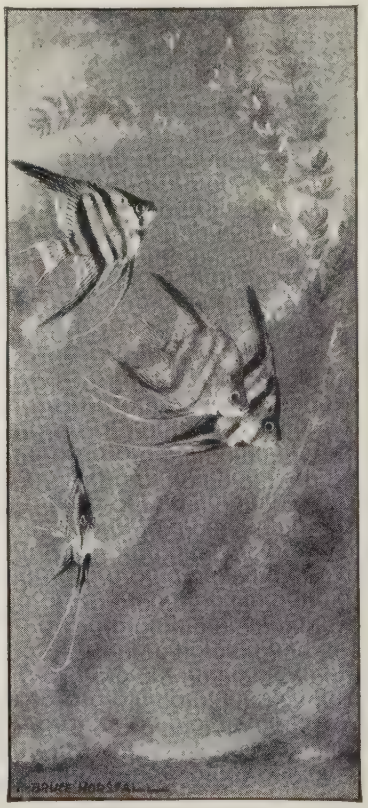
by Dr. William M. Mann
Director, National Zoological Park
Color Plates by R. Bruce Horsfall

WHEN a certain small boy was asked to write a composition on the habits of the cow, he wrote: "The cow is a domestic animal and ain't got no habits". If this is true of the cow, it is equally true of the commonest inhabitant of the home aquarium, the goldfish, which is really a domestic animal. Like other domestic animals, it has a distinct place in society, but the incipient naturalist-aquarist looks further afield for denizens of the glass tank which he ofttimes keeps above the radiator to provide sufficient warmth. So far, indeed, does he look that there is scarce a zoo-geographical field in the world that has not been tapped for fish that he might keep.

Common names are the result of long usage. Many of these fishes have only recently come into collections, so we find that the aquarist, like the gardener, is in many instances compelled to use scientific names.

The swordtail comes from Mexico and Central America and is really a glorified top minnow with green predominating in its coloration. It does not make a nest. There is no need to do so for the young are born alive, in broods of ten or twelve to more than fifty. It is peaceful, beautiful, and easy to keep; one of the most desirable fishes for the beginner in tropical aquaria.

Pterophyllum scalare, fresh water angel fish, moon fish, or leaf-fin, comes from the middle Amazon. The chief shipping port is Manaos, a thousand miles up the river. Here it lives in sheltered pools, among dense water weed, where it is caught and shipped, usually to Europe. There it is bred and exported to the United States. Some American breeders have been successful in rearing it here. Its curious form, dignified and graceful motion, and the comparative ease of keeping it in captivity, make it one of the favorite freshwater aquarium fishes, although the trip from South America, via Europe, makes it rather a costly indulgence.



FRESH-WATER ANGEL FISH OR LEAF-FINS

The paradise fish, of China, is named for its colors, not for its behavior toward its own kind. Because of the nature of its breathing apparatus it does not need aerated water, but is rather a surface breather. When mating time comes, the male makes a nest of bubbles, formed by the extrusion of a viscous material inflated by reserve air from the gills. In this nest he places the eggs, after fertilization. If they fall out, he blows them back and he does the same with the young when they are very small. Later on if he is not separated from them he will eat the youngsters, and incidentally, will kill his wife if he can reach her. Nevertheless, he is a handsome fish.

Rasbora comes from the Malay Archipelago. He is a desirable addition to any aquarium colony with his exquisite color combination which includes a triangle of intense black. His gentle disposition and extreme activity are added attractions. You may be sure that your specimens are imported, because so far it has never been raised in captivity.

The *Characidæ* are from tropical America and include a most diverse assortment of fishes, large and small. The pirahna or cannibal fish is the best known in literature, and *Pristella riddlei,* an attractive aquarium fish, is a small second cousin to it. Active in movement, and silver, black and maroon in color, it is a pleasing addition to any collection. It comes from the Orinoco River and occasionally breeds in captivity.

The fighting fish furnishes sport in Siam. You match your fish against the other man's fish and, if you are that sort of person, you bet money. Formerly the practice was licensed by the government. *Betta,* from the fresh waters of the East Indies, makes bubble nests similar to those of the paradise fish, and, in aquaria, is not nearly so quarrelsome as that species. Like all real fighters, it attacks only a worthy opponent of its own kind. When excited it distends the gills in a ruff-like fashion and the rich carmines and greens that it displays are as vivid as any in Nature.

Fish do not make a noise. There is no unpleasant odor connected with them if one does not create it by overfeeding, that is, putting in food in excess of the actual needs of the fish. Of course, if one does, the food disintegrates and spoils the water, which results, many times, in the death of the fish. They do not need as much food as is commonly thought, nor do they need it so often. Due care should be taken in regard to temperature. The six fishes mentioned in this article need to be kept above seventy degrees, while domestic fishes will flourish at ordinary room temperature. Small fish of any sort make interesting and desirable pets in the home because of their beauty of color and grace of movement. This half dozen are a few to be considered.

NATURE CALENDAR

NOVEMBER

by E. Laurence Palmer

SWIFT, the author of *Gulliver's Travels,* was born in November and his writings may suggest interesting lines of thought and Nature observation for the month. Particularly interesting may be Gulliver's affair with the Lilliputians. Though much smaller than Gulliver, they were able to do with him about as they pleased. Large size in Nature does not guarantee superiority in the struggle for existence. The world's largest prehistoric animals have not been able to survive. The largest living animals now are practically at the mercy of man. Man himself is, to some extent, at the mercy of the insects that eat his food, kill his domestic animals or attack him himself. Both man and the insects fail to survive when certain diminutive microorganisms find occasion to begin living in their bodies. November is a good month to look for evidence of the influence little things have upon big things in Nature.

Many people begin making collections of cocoons in November. Others look for the galls to be found upon plants. Many of these cocoons and galls are made more or less conspicuous by the falling of the leaves. Frequently, those who collect cocoons are disappointed by the emergence of creatures other than those that they expected would appear. The diminutive parasites of caterpillars are legion and serve most valiantly in keeping these creatures from destroying completely plants which are useful to us.

The galls which may be found in November are also interesting examples of the influence of small creatures on large plants. Not infrequently you may find that galls become so abundant on plants that the plants are destroyed or greatly weakened. Of course, galls are caused by a variety of living organisms. Some of these are insects. Some are mites. Some are bacterial and some are of definite fungal origin. Whatever the origin, they show nicely an example in Nature where small size is not a handicap to success.

As our civilization becomes increasingly complex by the perfection of precision instruments we become more than ever concerned over the presence of small things where they are wanted or where they are not wanted A little water in a gasoline feed pipe in our automobile may cause us great annoyance. A particle of dust in the radio may prevent us from hearing the election returns this November. A telephone or electric light wire of very small diameter may become broken and cause us great inconvenience, or the presence of a few bacteria in the milk we drink may cause sickness or death. Fortunately, like Gulliver, we have learned here and there how to get along with our diminutive masters. Little things save us tremendous effort. A drop of oil properly placed starts the refractory washing machine. A sharp-pointed phonograph needle saves us from distraction. A diminutive amount of material in our drinking water protects our health and so the story goes.

When one reads *Gulliver's Travels,* he is amused at the engineering feats of the hero's little captors. These can hardly begin to equal those performed by the host of silk-producing creatures to be found in Nature in November. Leaves may be discovered that have been folded together and held by silk for the protection of a variety of forms. Spiders may use their webs to hold their food captive or to bridge gaps across which they cannot fly or jump. Caddis worms in our brooks may construct nets which can withstand the driving water and capture a lunch when it is needed.

But engineering ability is not limited to the silk-producers. Many creatures show seemingly uncanny ability in transporting food, in constructing homes or in activities calling for a community of effort. Ants are famed for their remarkable ability in this direction though it is claimed that much of their behavior is a matter of strength rather than skill. Still their social organization is high and they accomplish much that brute force cannot achieve. In the construction of homes, ants are not the only small creatures with ability. The paper nests of hornets, the mud structures of mud-dauber wasps, the homes of caddis worms, the nests of some birds like the oriole's, all illustrate ability in construction possessed by creatures smaller than we. All of these things may be seen with ease in November if we will but set ourselves to the task.

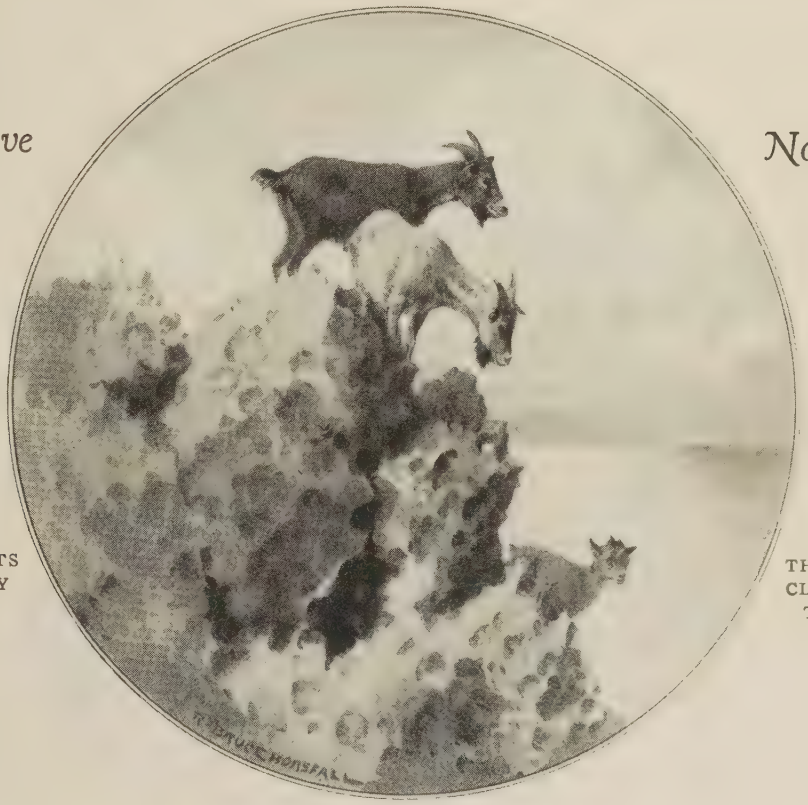
In November then, let's this year think of Gulliver and his experiences and try to adjust ourselves to the little things that are significant in Nature. A keen eye and an active interest will reveal many fascinating minute things.

AUTUMN

NATURE MAGAZINE

Volume Twelve
No. Five

November, 1928



A COMPANY OF GOATS KEEP THE SCANTY GRASS SMOOTH

THE KIDS LEARN TO CLIMB AS SOON AS THEY CAN STAND

THE LEAPERS *of* WAIKELE

Among the Strange and Interesting Fish of Hawaii

by Stephen Haweis

WAIKELE ISLAND'S rocks are bare and brown, pitted with holes and fitted with sharp points which accomplish as much destruction upon shoe-leather as a laundry on a lace collar. A company of goats, which belong to the Mormons at Laiea, keep the scanty grass as smooth as a lawn and bear their young among the stones. The kids learn to climb as soon as they can stand. This rock formation is caused by the continual beat of the sea and the evaporation of the water in the warm sun. The soft part of the rock is slowly dissolved, leaving the harder parts to stand like a skeleton. Near the sea the larger holes are filled with water that is more salty than the sea. The seaweeds and the many small things which live in and around them must accustom themselves to it or die. They are refreshed only at intervals when the sea throws a few fistfuls of new water in their direction.

Some of the little fishes in the pools will one day become big and desert the rocks, but there are also certain tough little fellows which will never go away. Small as they are, they are full grown. The striped convict fishes have brothers in the deep water just over the reef's brim which are twenty times their size, and there are several species of butterfly fish which may be found considerably larger where the water is deeper. Even those which are differently striped and colored may be the same fishes as these which do not look the same at all. Their clothes may vary as much as those of a five-year-old child and a fifty-year-old man. There are a great many fishes which we know only as large fish, the young of which have never been identified, but we know that somewhere and at some time they all came out of a tiny gelatinous ball of egg. Probably most young fishes are unrecognizable as sons of their fathers and mothers. Science can only be sure by laboriously counting their bones and the number of rays in their fins which do not change from year to year. It is one of the fascinations of looking into any rock-pool to realize

that before our eyes there is probably a secret which the most learned of specialists in fish, weed or coral have never guessed.

If the whole earth were suddenly reduced to the size of an acorn and if everything, including ourselves, were changed proportionally, we would never notice it. Dimension is merely a convention derived from comparing ourselves with a mountain, an elephant or a tiny fruit-fly. The greatest tragedies may be enacted within the smallest compass; the smallest mind may belong to the largest man. People travel miles upon miles to see some vast canyon or mountain; they climb weary slopes to see a hole in the ground, if it happens to be a volcano crater, perhaps extinct before time, as we know it began. Niagara is not more marvellous than a little stream; we appreciate it chiefly because it is so much larger than ourselves. A mere trickle is a vast fall to an ant, and, if you think of it, the world must be far more wonderful and magnificent to an ant than it is to us. When a bag of powdered sugar is upset, it is no great event to us, but in the ant world a huge mountain of transparent boulders has suddenly fallen from the sky, and every stone of it is exquisite food! Imagine a lava-flow of molasses dripped by a careless giant from a spoon a mile long. It was dipped from a crater of polished metal as high as the Grand Canyon, which may itself be moved a thousand miles in a moment,—and put back on the shelf. Or, perhaps a little dog, far greater in size to an ant than a whale would be to a man, buries a bone. It is scraped and licked nearly clean, but the insects mine the loose earth which covers it and steal enough food from it to feed their whole community for a month! It is just a matter of comparative size.

LIKE AUSTERE OLD GENTLEMEN WITH DOUBLE CHINS

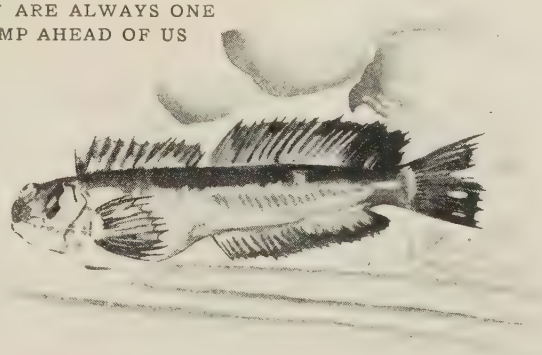
As I stand over a rock-pool I feel like a giant. My immense form looms over a lake as large as Hudson Bay with one foot over the Mammoth Cave and the other braced comfortably against a range of mountains not unlike the Alps. But when I glance up at the Pacific Ocean which breathes like a man asleep and is yet sufficiently awake to snatch at the rocks without ceasing and clasps every corner within its reach with elastic fingers of foam, I feel very small, small enough to be amazed by the wonders of a puddle, the vast lakes and caves and grottoes in which tiny monsters maintain a dynasty of terror. Look under a stone: one or two fishes, exactly the color of their surroundings will dash to other cover and vanish. A small crab, more like a piece of moss than a piece of moss, sits motionless in the disturbed sandy water. He hopes to avoid notice, but his movable eye tells him that he has been seen. In a moment he wrinkles his nose beneath his spectacles and picks at his beard with an immense finger and thumb as he makes up his mind what the next move shall be, to sit and risk it or move and betray his presence. Meanwhile a crimson and white shrimp lifts its striped claws and waves two long antennae, thin as hairs, as it backs its well-tailored skirt in the direction of greater security after the sea-quake. To a creature no larger than an ant a shrimp must look rather like a dinosaur; its eyes would stand out two feet from its sinister countenance and its "feelers", so delicate that I can hardly handle the creature without damaging them, might well appear like flexible whips of horny texture, sixty or eighty feet long!

Most of the living things in these sea-pools resemble their surroundings in color; all gray, brownish green and blotched like the rock about them. Nature's marvellous provision for the protection of the species, say the wiseacres with a theory, but in the company of these moss and rock-like people there are others for whom Nature forgot to perform. The shrimp with crimson stripes on a milk-white ground, with ultra-marine-blue joints where its legs are hinged to its mailed body, the vivid emerald green patch beneath, hardly fits the theory. It cannot be painted like a pantaloon for the same reason that its neighbors are gray. Warning colors then? Oh well, if you like; but it might be presumed that creatures which live side by side in two pailfuls of water must get to know each other well enough not to be over-terrified by appearances!

Scientists know that some of these little fishes, so spry to elude capture, are Blennidae, or the Blenny family, of whom there are many varieties and all sorts of relations. These, in the pools of Waikele, look like austere old gentlemen with double chins as they lie still upon the bottom resting on their spiked elbows; but they do not move like old people. They move like a flash and know everything that a fish can know about their own pool. Swift or slow as we may be they are always one jump ahead of us. They know every hole and its possibilities, but if all are defended or blocked they think quickly and skitter out of the water altogether, over the rock edge and into another pool which they know just as intimately. Every path is familiar and if we cannot think a little better than they we never see that particular specimen again. If we really want to catch one it is necessary to put our net not into their pool at all, but into the next one. It is a mean trick, for when the little fish plays his last card and slips over the wall he settles down comfortably into the net placed to receive him. Many a blenny has found his last home in a bait can thus, for they are excellent bait for any fish which is large enough to eat them.

But these little sea-folk are much better fun to watch than to kill, and some of their distant cousins are even

more remarkable than they. In Tahiti where the rivers are full of black, volcanic rocks, there is a pop-eyed group of blennies which lie out in the sun upon the hottest surfaces without, apparently, getting fried, as one would expect them to be. They dive into the water from the high mangrove roots on which they love to bask into the cool water for a minute or so and out again to shin up the rocks with their pectoral fins and fingers, taking every advantage of hole and cranny on the way. Then they sit on any projecting seat from which they can see all round with their bulging eyes which resemble the water-goggles of the pearl divers.



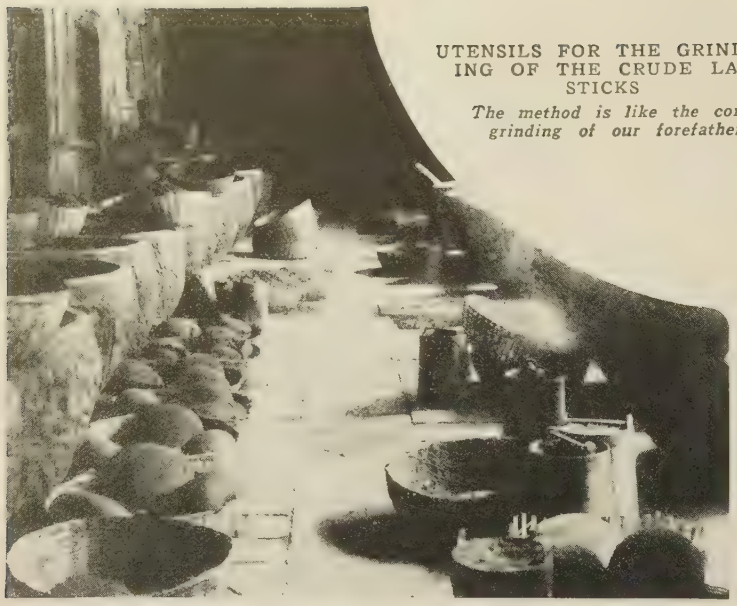
THEY ARE ALWAYS ONE JUMP AHEAD OF US

Fishes that come out of water! This is where the unbeliever does the very best of his unbelieving, but he is wrong. There are many fishes which leave the water at times and sometimes travel long distances to find a new home when the sun has dried up their pool or pond. India has its climbing perch; Africa its aestivating mudfish; eels may often be met with at night in damp hayfields near a stream. The strangest of such fishes are found in Samoa, in the real South Seas. Not only do they come out of the sea; they stay out, and have learned to climb upon the rocks with just as much skill as the flat rock-crabs which have eight serviceable legs to do it with. If danger threatens they will take to their fins at high speed. Even then they do not swim a stroke more than is absolutely necessary but skitter along the surface of the water like "ducks and drakes" to another and safer rock. Once they are out of reach of the clumsy giant (and they seem to know to a thickness of a fin what we can and can not do), they wait in rows just above the waterline of the last wave. Watch them without hostility and you will see that they have a special interest in each wave and never fail to be in the right place at the right moment. Every wave has a slightly different force and washes up to a different level. The fishes, whose technical name is *Periophthalmus koelreuteri*, slide up and down in perfect harmony with the wet edge,—more, in some inscrutable way they know exactly where each wave will come in advance. Have they keen sight to judge by its size how vigorous it will be, or do they make their calculation from its sound as it breaks? Nobody can tell, but it is quite certain that they are almost never caught napping, almost never mistaken. Down they all go together as the water recedes to wet their gills or to feed on minute things which the waves bring them, but up again always in time if the next is going to exceed the last. Here is evolution at work as it was in the days when the sea alone had living inhabitants. It was by crawling out of the water that the first live creature developed a tough skin and perhaps a shell to withstand the heat of the sun. Imperceptibly the gills are becoming better adapted to air-breathing than to water-breathing. They are becoming terrestrial fishes who have lost their taste for bathing.

And hence another incredible fish tale! It is no doubt foolish to believe all you hear without proof, but it is more foolish to deny anything without adequate reason, for the most astonishing tales are generally true. Nature is full of such tales, whether it be of fish life or in other fields. The rocks of the past are yielding up many strange and interesting evidences of a life long before and far different from that of today. It is hard to tell a better one than wise old Dame Nature!

IF YOU WANT TO CATCH ONE PUT YOUR NET IN THE NEXT POOL

The December issue of Nature Magazine will be rich in articles of timely interest. An outstanding contribution is the leading article on our fur-bearing animals and their plight. Hugh Bennett writes of The Land of the Magotes and Bottle Palms; Charles Fitzhugh Talman of The Inside of the Globe; Will C. Barnes of The Tung Oil Tree, and Ethel I. Mason of The Poinsettia. Mr. Horsfall has painted another beautiful Christmas cover reminiscent of his Cardinal cover of last year, some fifteen hundred copies of which were purchased by readers who asked that a special reprinting be made. Incidentally, a few of these remain and may be had for twenty-five cents.



UTENSILS FOR THE GRINDING OF THE CRUDE LAC STICKS

The method is like the corn grinding of our forefathers

THE "HUNDRED-THOUSAND" INSECT

IT DOESN'T sound very much like an insect, does it—this great, soaring tone of Caruso's matchless tenor or this liquid note of Galli-Curci or this entrancing melody from Kreisler's violin?

But an insect, nevertheless, an unassuming, short-lived, tiny, reddish-colored little being, cloistered all its life long in a cell of its own building, is very probably at the bottom of these heart-moving phonograph harmonies. For it is just such a creature that makes the substance from which a large part of our phonograph records are shaped. These black, shiny disks, with their circling grooves embedding the finest of the world's music—not so long ago they were only gum-like lumps on the twigs of a far-off forest, piled up there by the life-work of a little mite hardly half a pin-head in size.

Strange indeed are the ramifications of modern invention and modern commerce when through their agencies such a humble child of Nature, hidden away on the other side of the world, can be made to catch and hold for us for centuries any sounds of voice or instrument we may happen to find delightful!

It is an interesting little organism, this "lac" insect, and we will find it well worth while to drop in upon it and get acquainted with one more of our unknown servants—one of the oldest of our servants, indeed, for it has been yielding a useful product to the human race for at least 2500 years. To see it at work we must cross some eight thousand miles of sea, mountain, and desert, and come to rest in one of the forests or native dooryards of East-Central India. Only in various parts of the peninsula of India and of the neighboring Burma and Siam does the lac insect thrive and do its best work, and even there particular trees only provide suitable feeding grounds and act as hosts. You may see that it is very particular.

The time of our excursion, we will say, is early summer. We come to a tree many of whose branches are crusted over with a lumpy, irregular, amber-like coating. We find that it is a layer built up of a multitude of little flat gummy domes, all run together, and each one of these domes is a living tomb for a member of the lac tribe. Or rather, it has until recently been a living tomb. When we arrive it is a real tomb, encasing all that is left of its original builder. But there is life inside the tomb, at that. For the larvae are hatching, and during the next three weeks will be coming out, through little holes in the crust, to the freedom of the open air.

Thrilling indeed would it be for any one of us to be confronted with practically all our life adventures in a single day. But that is what the newly-arrived lac insect faces. In a few hours, a day and a night at most, its fate is determined. Lucky for it now if its birthday is fair and calm. For that trickle of rain that might otherwise run along the twig would be a roaring flood to sweep it to destruction, or the brisk breeze a hurricane to whirl it into oblivion, or the pelting hail a bombardment of huge cannon balls, each as big as a house. If these all hold off there is still the problem of finding a spot where the bark is tender and juicy. All its energies the baby lac concentrates on that problem. If at last it comes to a sheltered area where the bark yields softly to its probing, it has all the good fortune which any reasonable lac has a

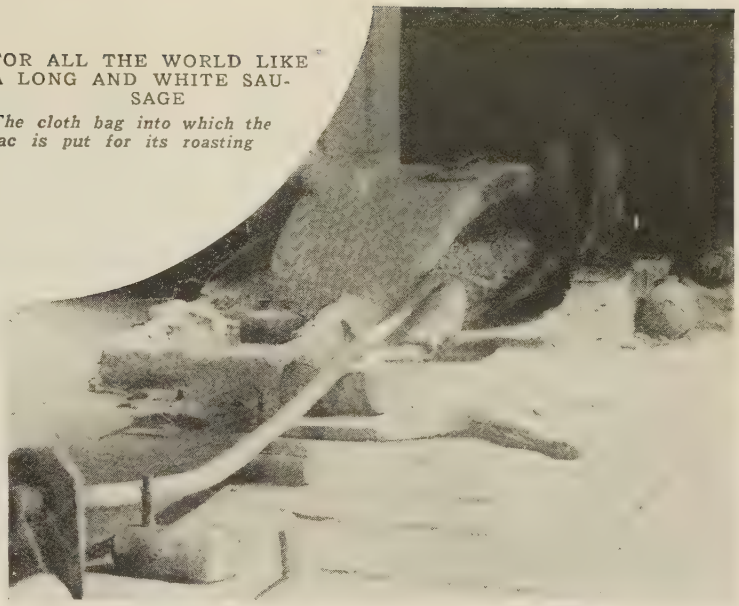
SCRAPING OFF THE COATING OF THE TWIGS

This leaves the short lengths of crude lac as sticks

The Story of the Making of Shellac

by Otto Wilson

In this article Mr. Wilson, well known as a writer on economic subjects, tells the interesting story of the lac insects. This valuable mite is known by the natives as the "hundred-thousand" insect because this expresses their naïve conception of its numbers at swarming time. Its life is devoted to service.



FOR ALL THE WORLD LIKE A LONG AND WHITE SAUSAGE

The cloth bag into which the lac is put for its roasting

right to expect. Only a few, comparatively, are so lucky.

Once it has so placed itself, it is, literally, fixed for life. For the males a few more hours of wandering remain, at the close of their existence, but for the females the one adventurous excursion of that first day's existence is the last.

Sinking its beak down through the bark into the sap-stream beneath, the lac insect draws up its nourishment as through a shaft. Within its body the sap is changed chemically into a new substance, a resinous fluid, and this fluid slowly exudes through many pores of the body wall. It forms an amber-like coating which grows thicker and thicker and builds itself into a rounded little house. Blending with similar coverings of near-by neighbors, the casing gradually becomes part of a resinous mass, which week after week and month after month covers the twig with an ever-growing, more or less plastic layer, spotted with little holes through which protrude a multitude of long, waxy, unusually thin and hair-like threads.

OVER A FIRE THE LAC IS "ROASTED"

Twister and helper turn and turn as the syrupy liquid exudes

After one to three months, depending on the season, the males slip out from under their shell, and after a short breeding season wander away and die. The life of the female is some months longer. Having no further use for legs or eyes she presently discards them by moulting, and becomes a pear-shaped sac. But she continues to suck up sap more industriously than ever, and grows much larger. Three weeks before her life span ends she begins to shrink. Then she lays her eggs and her life is finished. Her numerous progeny issue forth from small holes in the covering shell to find their own places on twig or branch, if they are fortunate, and repeat the life cycle in their turn.

Twice a year is this cycle lived through, the summer season lasting some three months and a half and the span which includes the winter, eight months and a half.

Thus does Nature, through her myriad little agents, bring the resinous substance as far as the limbs of the forest trees. Enter now the human factors, to pick it up and carry it on its long commercial journey—a journey which in its earlier stages takes the observer through many a curious market scene characteristic of this deliberate, timeless, custom-bound East.

First comes the dark-skinned native, half-naked, white-turbaned, to climb like a shadow into the host-tree and slit the lac-bearing twigs with his sharp knife. Perhaps he may want to inoculate some other tree with the insects. If so, he ties the separate twigs on to the branches of the new tree or hangs them there in bamboo cages until the larvae have emerged. Then he dries the lac twigs and either scrapes their coating off or cuts them into short lengths of crude lac to be sold without further preparation.

Down the roadway, in due course, appears a slow-moving bullock-cart or train of carts. It is the outfit of the "baipari", the huckster of India, who winds his endless way through the country from village to village, bringing the natives cloth and trinkets and buying their various wares. Gathering his bits of stick-lac here and there he carries them to some central trading village. There he meets the buyers, and usually through an

BRINGING IN THE LAC
The native transportation system functioning well

"arhatiya", a commission agent or broker, sells his gleanings.

Sometimes the sale is by open auction. But often it is consummated by a traditional method of bidding known as "the cloth method of secret auction".

Around the pile of stick-lac to be sold gather the owner, the "arhatiya", and the bidders. Each holds out his right hand to the center of the ring. Over the hands a cloth is thrown, and then each dealer in turn grasps the hand of the commission agent and indicates by signs the price he is willing to pay.

If he wishes to bid, say, thirty-eight rupees (18 pence) per maund (82½ pounds), he first clasps three fingers of the broker's hand. Each finger represents ten rupees. Then he again grasps the fingers, this time enclosing two entire fingers and two joints of a third. Each joint represents one rupee, so the total bid is thirty-eight. When all the bids are in, the broker indicates to the owner in the same silent manner the highest amount offered, and if the owner nods acceptance the broker whisks away the cloth and throws a handful of lac toward the successful one. From start to finish the transaction is thus carried on without a spoken word.

Through many hands the lac comes at last to the manufacturer. He grinds it in stone hand-mills similar to corn grinding mills, picks out sticks and trash, sifts and winnows it, and gets it ready for washing. The red dye contained in the bodies of the insects, the "vermilion" of ancient times, for ages made up the only valuable contribution of the lac insect to human needs. Now it is almost worthless because of the coming of aniline dyes. It must be carefully washed out to produce the better grades of lac.

HOW THE TREE TWIG LOOKS
The picture below shows the exudation of the lac and the appearance of the twigs on which the insect has been at work. In the lower picture the native is collecting the lac from its host tree

The lac, now no longer "stick-lac" but "grain-lac" or "seed-lac", is put into large stone jars, covered with water, and allowed to stand as long as twenty-four hours. Then comes the professional washer. Standing in the jar and holding on to a horizontal bamboo rod, he turns and twists himself right and left, rubbing the lac against the serrated sides of the jar. The process is repeated several times with fresh water until the lac-dye is well washed out, and the golden yellow grain lac is then spread out to dry,—now about 90 per cent lac.

Now comes the most picturesque step of all. After the lac is sifted and graded, and the better grades are mixed with small amounts of yellow arsenic and various proportions of rosin, the mixture is "cooked" and melted down to form the final commercial product. The demands of the consumer, however, are gradually stopping these tricks of adulteration which do not improve the product.

Into a long cloth bag, of double thickness

for the better grades of lac, the "roaster" pours the blend. Thirty to thirty-five feet long and only two or three inches in diameter, the filled bag is like nothing so much as a great white sausage. The roaster holds one end and the helper slowly twists the other, while one section after another is held before a charcoal fire. As the contents melt and ooze through the cloth the roaster scrapes off the syrupy liquid with an iron scraper, mixes it with that which has run onto the stone floor, sprinkles it with water, and bastes it at times over the bag until it is all thoroughly mixed. Then the plastic mass is handed over to another assistant, who spreads it, with palm leaves and hands, on to a porcelain cylinder filled with warm water. He presses it to an even thickness and then, after warming the pliable sheet before the fire, seizes it with both hands, both feet, and his mouth, and stretches it to twice its former size.

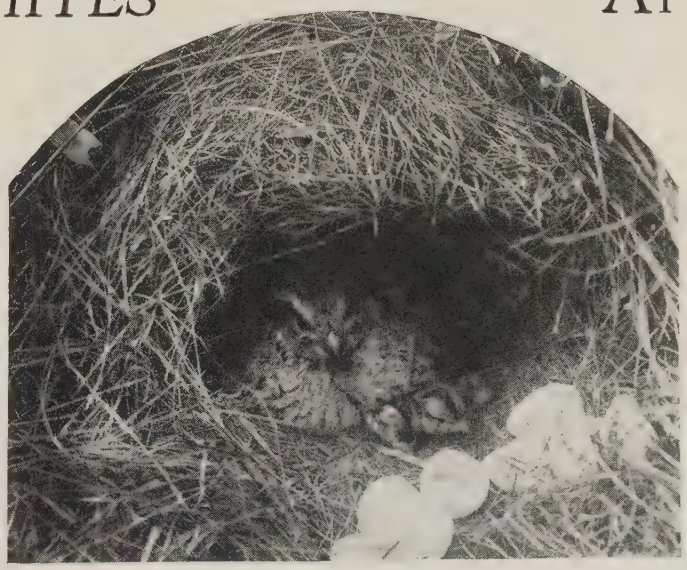
That is the final step in manufacturing shellac. The sheet is laid away to cool and the hard shell is then broken up into small pieces. Sometimes instead of stretching it into sheets the roaster ladles out many small "dabs" on the stone floor, stamps each with the trade-mark of the house, and allows it to cool into disks called "button-lac" and garnet lac. In either shape it is now ready for packing into chests and shipping to far countries. Natives make small articles from the residue.

But now it bears another name—a name which has become one of our most familiar household words. No doubt you have guessed it already. Just as the lac started out as plain "lac", then became "stick-lac" and then "grain-lac", "seed-lac", or "button-lac", so now it is "shell-lac"—yes, that same shellac over which you walk every day. It glistens out at us from piano and floor and many another polished surface, and it helps to fill the air with music. But it also helps the cause of civilization along in any number of other ways. It finds its way into electrical apparatus, billiard balls, sealing-wax, shoe-polishes, cements and glues, inks, hats, tiles, imitation-ivory articles, and a score of other objects. It is even used for glazing chocolates. A dozen times a day, no doubt, and in as many diverse ways, we make use of the services of this insignificant little red creature in a far-distant, ancient land, and never dream of its existence.

But the lac insect is not unique in that respect. Our unknown servants, in these times, are almost legion. All unseen they constantly smooth the path of civilized man, handing him the hidden riches of Nature in every part of the earth to satisfy his vital needs or his most casual whims. And few learn to understand their rôle.

BOB-WHITES At Home

by C. L. Bundy



Everywhere little brown heads, and clean-cut shells at the front of the nest

The eastern bobwhite or quail is perhaps as universally liked as any member of the bird family, not only from the epicurean standpoint, but also because of its dainty domestic habits and because of its helpfulness to the farmer. And so when we discovered a bobwhite nest along the farm yard lane while mowing weeds, we were delighted. From then on, a close watch was kept on family developments, for seventeen eggs were in the nest, and the mother brooded close when humans were not near.

Many times we tried to photograph the mother on the nest, but each time she left before an exposure could be made. One day about noon, however, I found that the day we had been waiting for had arrived—the youngsters were hatching. Small brown heads were sticking out all around, taxing the mother's spreading capacity to the utmost. Shells as clean cut as though by a knife were rolled to the front of the nest.

With all possible haste I secured my camera and hurried back to the scene of action. Remembering past experiences I set the outfit up at considerable distance from the nest, and made an exposure, then, with bated breath, moved slowly nearer. The mother did not appear to be disturbed in the least, so I took a stick and very carefully parted the grass that interfered with a good view, and made another picture. Still she remained quiet, so I reached forward, and pulled away a few remaining blades of grass from the entrance of her home. At times I worked within a few inches of her bill, but save for a slight ruffling of feathers she never budged. I made a few more exposures, and left the mother and her precious brood in peace. Two hours later the little home was entirely deserted.

HE IS SOMETIMES CALLED "BILLY" OWL

He is frequently seen perched on a fence post soberly regarding the passerby and always keeping his face toward you as you move

THE GROUND OWL

An Interesting and Common Western Bird

by Joseph Dixon

of the University of California

THE ground owl is one of the most interesting birds of the broad plains of the West, and has been found living below sea level in Death Valley and up to five thousand feet altitude in the plateau region of northeastern California. These round-headed, yellow little elves, often called "Billy" owls, are known by sight to more people in the West than is any other species of owl. This is due largely to their being abroad in the day time, when most other owls are hidden away in some thicket fast asleep. Then, too, the ground owl lives in open country and has a habit of perching on fence posts by the roadside. They also have a curious manner of watching passersby, which brings them to the attention of people traveling along the highways.

AN AID TO THE FARMER AND A REAL FRIEND

The ground owl lives largely on insects and small mice and should be protected

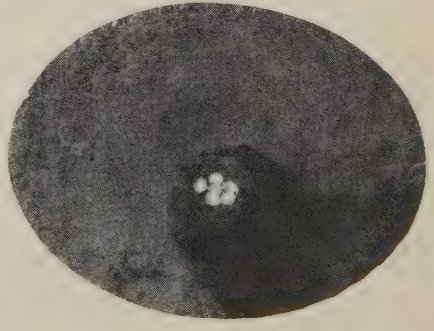
Owls have their eyes placed in the front of their heads like people and not, chicken-like, on the sides of the head. This gives them better vision and since they hunt a great deal at dusk, or even at night, keen eyesight means much to them.

If a person walks round a "Billy" owl the bird's body remains stationary but it keeps twisting its head around so as to face the intruder at all times. Some people say that if a person walks slowly around and around, the owl will finally twist his neck off. The bird does twist his head around until he is looking straight behind his back. Then in a quick turn, so rapid the human eye can scarcely detect it, the motion of the owl's head is reversed and he is again looking at the intruder over his other shoulder. No! you can't make him twist his neck off. He is far too wise for that.

Another story is often told about the ground owls, rattlesnakes and ground squirrels all living together peacefully in the same burrow. It is true that the ground owl is our one species of owl that nests underground. But I have dug out at least twenty-five ground owl nests and I have never yet found any rattlesnakes or squirrels living with them.

The owls make their nests near the ends of old unused ground squirrel burrows. The nest often consists of finely-broken horse manure. It is believed that, in addition to serving as a soft nest, the manure, especially when the ground is damp, also serves as an incubator. I have thus found the round white eggs still warm after the ground owl had been off her nest for half an hour.

Ground owls are most active during warm evenings when their mellow call *tu'hoo, tu'hoo, tu'hoo* can be heard. Their food consists mainly of grasshoppers, Jerusalem crickets and small mice not quick enough to escape.



NEST OF THE GROUND OWL

Its eggs are laid in an underground burrow and vary in number from three to nine

FLORIDA CONE
Yellow or yellowish-pink with white stripes

SHELLS OF OUR SOUTHERN BEACHES

They Offer Charm and Beauty in Wide Variety

by William Alphonso Murrill
Illustrated by the Author

Dr. Murrill is no newcomer to the pages of Nature Magazine, having contributed several outstanding articles in the past. A Virginian by birth, he was educated at two of the Virginia colleges and at Cornell. He was for many years assistant director of the New York Botanical Garden and widely known as explorer, lecturer, editor and writer. He has collected scientifically from many corners of the world, and his writings, both scientific and popular, cover an unusually wide range of subjects.

PAPER FIGS
Shapely shells, white or delicate fawn tint

WHY seek the far East Indies or other distant shore for rare and beautiful shells for your collection cabinet or just for the mere joy of seeing them? Where the waters of the Atlantic and the Gulf lap the shores of the Americas from Hatteras to Rio are to be found a wealth of shells in variety and beauty. There is much joy in the amateur collecting of sea shells, a pursuit that makes a fascinating hobby.

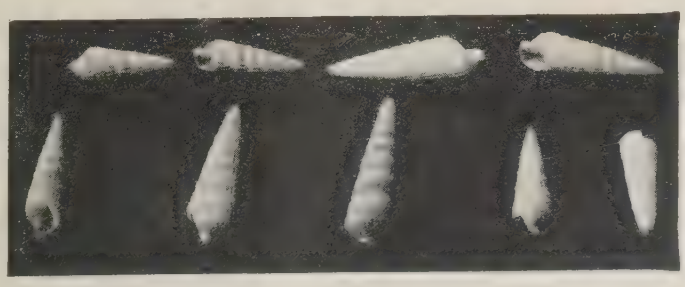
Among our most attractive shells are the cones, prettily marked and bringing with them a thrill when found fresh from the tide. The largest specimens may be two or three inches high and an inch or more in diameter, while the smallest reach scarcely an inch. The Protean cone, or "Chinese Alphabet", is white with brown dots or splotches in oriental patterns; the Florida cone yellow or yellowish-pink marked with pearl-white stripes; and Peale's cone is either bluish-brown with lighter spots or reddish-brown with sky-blue spots.

The animals are shy; some are said to be venomous; and all are confined to the warmer waters. When alive, the shells are covered with a dull, unattractive epidermis. Many beautiful species occur in the Pacific and Indian oceans. *Conus gloria-maris* is rare and of great beauty, commanding a high price.

The scallops form another pretty group, notable for beauty of form and great variety of coloring. The outline of the scallop shell has been used in conventional design since the days of the ancient Cretans, and it was adopted by the Crusaders as an emblem of the Holy Wars. The animals rank rather high among the mollusks, being capable of locomotion by opening and closing their valves, and have numerous attractive eyes on their mantle edges.

The northern species has scarlet or orange-colored mantle margins with rows of bright-blue eyes. The species common south of Hatteras is quite similar and dives into the mud when pursued, muddying the water by opening and shutting its valves and thus making good its escape. It measures from one to two inches in diameter and the shells are mottled or decorated with zigzag lines of almost every shade of color from yellow or orange to pink and blue. The rare "Lady's Fan" and "Lion's Paw" belong to this interesting group.

SCOTCH BONNET PLUMP AND PRETTY
(Below) Screw shells endowed with many beautiful turns and curves



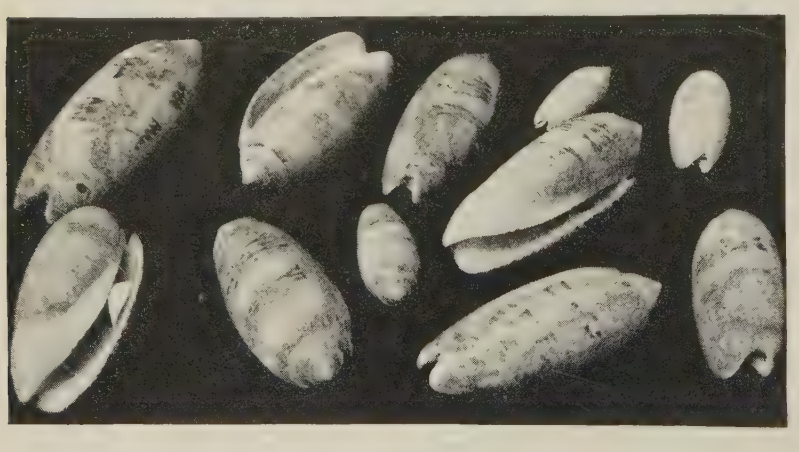
Two kinds of moon shells are found on our beaches, both easily recognized by their resemblance to the common land snail. The shark's eye, which reaches two inches or more in diameter, is nearly smooth, polished, bluish or pale brown above, pearly-white be-

low, and rich yellowish-brown or chestnut within. The tiger's eye is of similar shape but smaller and whitish or yellowish in color with bars of pale chestnut and zigzag lines of a dark purple hue. The spire in both species ends in a small dot resembling the pupil of an eye, which accounts for the common names used in some localities.

The murex group is represented by two common species, the apple murex and the lace murex. Both are peculiar, twisted, rough, knobby shells with tapering ends and a conspicuous mouth, which is almost circular and contracts below into a narrow canal. The apple murex is two or three inches long and ash-gray marked with chestnut patches, while the lace murex, of similar general shape and size, is wonderfully sculptured over its surface and ruffled at its edges. These are sometimes delicately tinged with rose. The usual coloring of this shell is reddish-brown to dark chestnut, but I have found it entirely white.

WELL-NAMED THE ANGEL'S WINGS

For beauty of sculpturing and purity of appearance, nothing on the beach can excel this not uncommon shell



OLIVE SHELLS GRACE ANY SEASHORE COLLECTION

(Below) The home of the large sunset clam, a beautifully-tinted shell

The animals of this group are perfect pirates, living in rocky places like the robber barons of old and pouncing upon nearly everything they meet. The famous "Tyrian purple" dye was made from species of *Murex* and *Purpura.*

The tulip shells are among the handsomest shells we have, being graceful in shape and varied in color pattern. The giant tulip or band shell reaches one or two feet in length; its surface is knobby and yellowish-brown, while the aperture is orange-red. The animal is brilliant scarlet and is one of the largest of all the gasteropod mollusks, and much sought.

The tulip shell is spindle-shaped, from four to eight inches in length, and variously colored and marked with narrow spiral lines set close together. In one of the chief color patterns, the surface is light bluish variegated with olive or chestnut-colored blotches; while in another it is pinkish with revolving black lines.

The striped tulip is of similar shape but smaller and the revolving lines are farther apart. Its color varies from light yellow to bluish-white, purple, or gray, with clouded longitudinal streaks of olive. Encircling the shell are from four to seven purple or blackish lines, rather far apart, which have suggested the scientific name, *Fasciolaria distans.*

Another shapely shell is the paper fig, usually three to four inches in length, fashioned after the figure of a pear, very thin, and white or delicately fawn-tinted on the outside, with a golden-brown lining. There are rarely any spots or markings except faint brownish lines radiating from the almost flat spire. The animal occurs from North Carolina to the West Indies and the shores of the Gulf of Mexico, frequenting shallow waters with sandy bottoms.

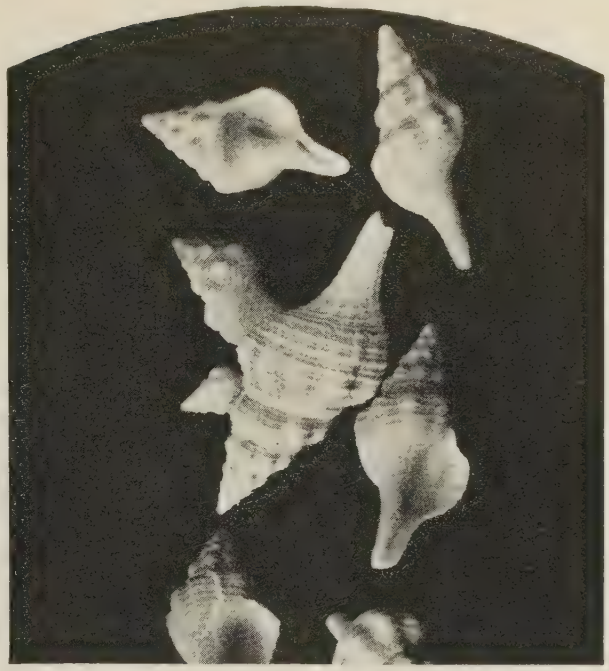
The "bloody clam", a member of the ark shell group, is well-known about Long Island and the Jersey Coast. It is unusual in having red blood. The heavy ark, especially abundant south of Virginia, is one of our commonest spe-

cies, occurring all the way from Cape Cod to Texas and the West Indies. The animal has no siphons but possesses a foot of unusual size and has rows of composite eyes upon the edges of its mantle. The shell reaches two or three inches in length, is exceedingly thick and heavy, and has about twenty-five conspicuous ribs extending from each prominent beak. When alive, its surface is velvety and jet-black, but the epidermis gradually wears away, exposing the white interior.

Noah's Ark, found from North Carolina to the West Indies and also in the Mediterranean, is three to five inches long and the valves are shaped somewhat like flat-bottomed boats. Like those of the heavy ark, they are strongly ribbed, but the brown color pattern resembles that of a hawk's wing or a turkey's wing, which has suggested the common names used in some localities.

Few groups of shells possess more genuine interest than the cockles, comprising as they do species of wide distribution and great beauty, beloved from the earliest days of our childhood. When the valves are united, they form the exact figure of a heart; and, when separated, each makes a pretty boat with shining interior capable of riding the waves of almost any bathtub!

The large cockle, three to five inches in diameter, occurs from Virginia to Texas and the West Indies. It is beautiful both in form and coloring, but almost too conspicuous. Sometimes the valves are used in cooking and serving crab meat or fish. The rough cockle is very similar, only of smaller size, usually about two inches long. Its colors vary from clear yellow to salmon, purple, and brown, blotched and shaded in many ways. The smooth cockle, a much rarer species in most localities, is about the same size as the rough cockle but lacks its strong radiating ribs and decided colors. It is pearly or milk-white, with indistinct concentric bands of cream color, and highly polished both without and within. In some places it is called plover's egg, by the same sort of people who call our tiniest species, with its brilliant lively colors, the bird's egg.



SPINDLE, OR GIANT BAND SHELLS

Their odd shapes and interesting markings make these shells of much attraction to the collector

JUNONIA,—A RARE TREASURE OF OUR SEASHORES

(Below) Lace murex, wonderfully sculptured and ruffled of edge

The well-known hard-shell clam ranges southward to Florida, where it is represented by a large variety sometimes weighing five pounds, with a massive shell six inches in diameter. The "cross-barred Venus", a common southern species, is much smaller, being only about an inch in length. It is beautifully ruffled externally when fresh, but the dirty-white ruffles soon wear away and the shell is then white with indistinct crossbars and a purple-and-white interior.

Another southern species is the turkey egg, so called because of its spots. It reaches two or three inches in length, is polished like porcelain, and of a fawn color blotched with violet-brown, while the interior is white and shining. A much larger and longer species, reaching six inches, is known as the giant or sunset clam. Its shell is as smooth as china, colored a faint buff or lilac, with pinkish rays suggesting the setting sun. It is graceful in outline and delicate in coloring.

KEYHOLE LIMPET
Sometimes it is called Mandarin hat

Although known from Hatteras southward, it is not always easy to find good specimens. The "setting-sun shell", often sold as a curio along with the "bleeding tooth" and certain others, is a different species, superb in its remarkable coloring.

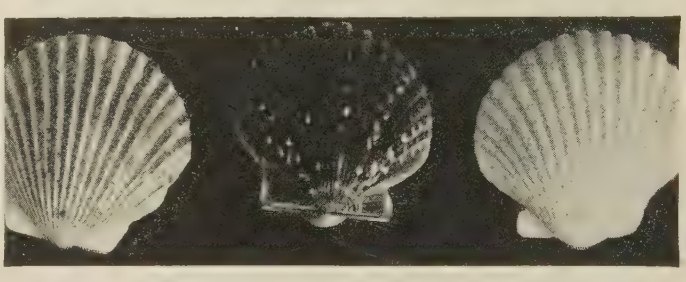
No real collector would think of overlooking the strangely shaped and highly polished olive shell, which is not rare between Hatteras and the West Indies but varies in freshness and the character of its markings. It is about two inches long, cylindrical with slightly tapering ends, and yellowish-white or bluish-white in color, marked with angular lines of pale brown or chestnut, which suggest lettering. The mouth opening is very long and the lip is lined with violet, fading to nearly white. Scientists know it as the lettered olive, while in some places it is called the Panama. A tiny Floridian species of the same general appearance but only one-fifth of an inch in length is known as Olivella, or little olive.

Small shells usually receive scant attention from the beginner, but they are interesting and beautiful just the the same. The screw or tower, for example, with its many graceful turns, first gave the great Archimedes a certain valuable idea. The wedge shell or pompano is like a dainty butterfly dressed in all the colors of the rainbow. The bubble is paper-thin and marbled in gray and brown, like a mixture of mud and foam, while the keyhole limpet certainly deserves its name, unless one prefers to call it the mandarin hat, which fits it equally as well. These are only a few of the many small shells on our southern beaches that await our attention after we have studied the larger ones to our hearts' content.

The Scotch bonnet is a plump and pretty shell, always desirable in its perfection. It occurs along our coast from Hatteras southward and is abundant in the West Indies. Its length is about two inches or more; its surface finely glazed and spotted with brown on a bluish-white background. The lip is marked with prominent teeth and is shining white if not beach-worn. One may look long even in the best localities before finding a perfect specimen.

Junonia is a short name, but a long journey awaits a young shell-lover unless he happens to have "beginner's luck"; for this is one of the rarest and most desired treasures of our shores. It occurs only in deep water off the coasts of Florida, and is sometimes washed ashore during severe storms. The shell is oblong, measuring about three inches, with a long aperture and cream-colored surface ornamented with spiral rows of squarish orange or deep-red spots. The lip is thin, easily broken, and lined with white.

ROUGH COCKLE
A shell of varied beautiful colors



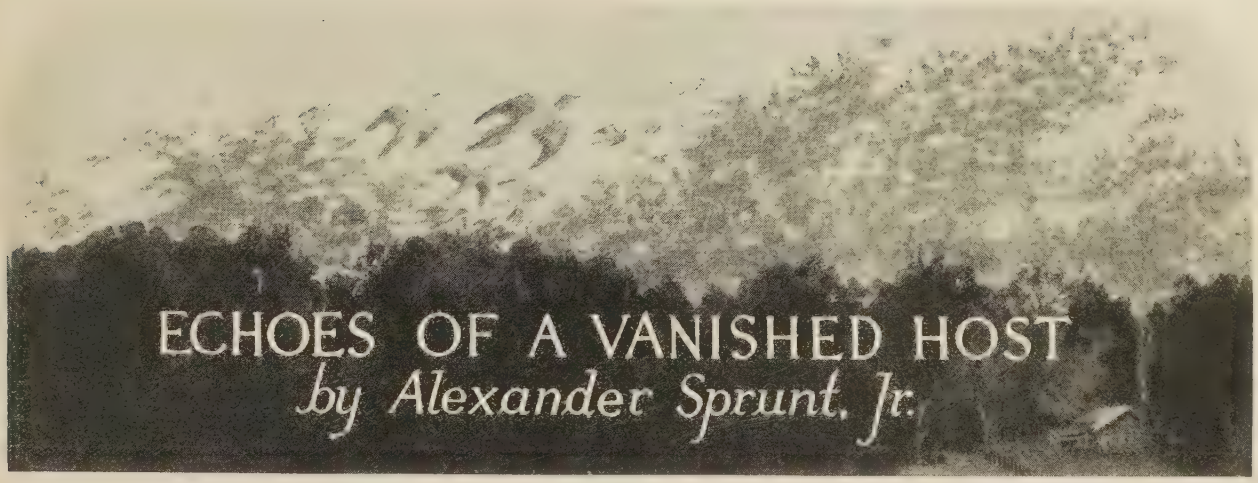
THE SCALLOPS FORM A PRETTY GROUP
The outline of this shell has been used as a conventional design for many centuries

TIGER'S EYE
One of the moon shells resembling the common land snail

Not nearly so rare as Junonia but for beauty of sculpturing and spotless purity nothing on the beach can excel the angel's wing. If one knows the name, no other description is necessary. The shells are usually about six inches long and are rarely found in perfect condition. North of Hatteras the angel's wing is rare; in Havana, it is commonly sold in the markets for food.

THE HEAVY ARK SHELL
A common species found from Cape Cod to Texas, specially south of Virginia

The shells of these mollusks are so beautiful and their gathering so fascinating, that we are in danger of forgetting that these delicate and beauteous structures are, after all, only the "skeletons" of creatures whose structure and functions are as wonderful as those of any of earth's creatures. Ages before man appeared, the mollusks were busily working out their destiny, living their various lives and dying, contributing their skeletons, slowly formed from the limey content of fresh or salt water, to earth's structure. Unnumbered myriads have thus helped to build up the layers of limestone that mark the former beds of lakes or seas. In other places their remains form limey layers that may be used to fertilize the adjacent fields. In life they furnish food for many creatures, including man. In death they help to form the earth itself, or, with their beauty, delight the eyes of earth's inhabitants. The evil that men do lives after them. The beauty of shells, however, is not interred.



ECHOES OF A VANISHED HOST

by Alexander Sprunt, Jr.

THE late afternoon sun was waning. The slanting beams shone warmly on the bosom of the slowly flowing river, as it wound sinuously between the wooded banks, broken here and there by cleared fields. A drowsy stillness lay over the land. The faint hum of wandering insects, or the discordant rattle of a kingfisher, were the only sounds which disturbed the brooding solitude.

Near the edge of a small clearing which bordered the bank of the stream stood a cabin. It struck a comfortable note amid its green surroundings,—the neat flower beds, pebble-bordered walks and well-kept outbuildings bespoke a thrifty and industrious householder. Two children busied themselves over some trifle in the yard, while occasionally the figure of a woman appeared in the open doorway as she glanced first at the playing tots and then toward the dark line of the forest. This scrutiny at last had its reward. As she watched, the figure of a man emerged from the woods, and approached the fenced-in cabin grounds with long, swinging strides. Halfway across the field he stopped, and inclining his head, stood in a tense attitude of listening, his gaze fixed over the tree tops behind the house. The children, seeing him, ran toward the gate with shouts of welcome, but his upraised hand hushed them into silence. Sensing something, they too stopped short, and, following their father's gaze, turned to stare across the forest.

A low, though distinct, murmur, hushed by distance, but ever growing into a louder hum, sinking, rising in an increasing monotone, came across the still air. It vibrated steadily, rose and fell in growing tones, its wavering cadence as uninterrupted now as the voice of the restless surf. Rapidly it mounted higher, developing into a moaning roar, pervading the whole expectant stretch of field and stream. The children glanced at each other wonderingly, and moved, half fearfully, toward the house. As though some giant cataclysm was about to occur, the roar deepened and grew in volume until the very air seemed to tremble, when, over the tree tops, appeared a swiftly rolling dark mass, its outer edges broken into thin streamers, which opened and closed as though a thousand individual particles were being hurled about by the violent momentum of the central body.

The man's face lighted; he broke into a run. "The pigeons, mother", he shouted, "they are back again". Suddenly, the light of the afternoon sky faded,—twilight, almost darkness closed over the clearing as the forefront of the mighty mass passed over the cabin. The children, huddled together, glanced upward in fearful wonder as the rolling billows swept over them. It seemed as if the roar of a mighty storm was convulsing the countryside. Rank after rank, a vast company of hurrying birds, beating the air with a million wings, dipped toward the farther woods, their wide spread phalanx shutting the sky from view.

Company after company settled into the woods, lighting on the swaying trees until their groaning branches could stand no more. Sharp cracks resounded through the uproar, the swishing crash of falling limbs passed unheeded as they poured their living freight to the ground, covering them with a mass of twigs and swirling leaves. Whole trees swayed, bent and collapsed to the forest floor, crushing hundreds of the fluttering birds into the earth. Band after band circled overhead, dropping in, now rising to swirl about each other in indescribable confusion over the swarming multitudes in the trees below, while lower still, on and under the litter which covered the ground, were bleeding bodies, broken wings, and a thousand trickling streams of red.

Pandemonium reigned as the larger part of the host moved ever forward overhead, to fill the trees for miles around with members of its stupendous company. Little by little, the uproar grew less, the roar sunk into a troubled murmur, died down, flared up again as the splintering crashes echoing among the forest aisles bespoke more birds hurled downward to their deaths, and, at length, true darkness came, casting a dusky cur-

The great auk, the Labrador duck, the Carolina paroquet and now the passenger pigeon—of these extinct species has Mr. Sprunt written. Soon the Curator of Ornithology at the Charleston (S.C.) Museum will begin a new series of articles on those birds of America that are fast joining the others, and that will be to another generation only the subject of romance and history, unless action is taken.

tain over the whole wild scene. The laden trees grew quiet, the fluttering, broken bodies on the ground were stilled. And on the face of the man who still watched from the edge of the clearing was a look of wonder, not unmixed with awe.

Of all species of birds which have become extinct in this country, it is safe to say that no one of the several commands such widespread interest as does the passenger pigeon. It is the bird toward which the mind turns naturally when the word "extinct" is used, and certainly the features of its history make most interesting,—and tragic,—reading. A parallel has always existed in the writer's mind between this bird and the American bison. Once both occurred in countless thousands, both were supports of the native inhabitants of this country, and both fell victims of the ruthless domination of civilization. However, the bison came off best, as it is still with us, and bids fair to remain, but the type of slaughter which came so near wiping them out completely obliterated the less fortunate pigeons.

THE VICTIM
Needless slaughter, cruel butchery and lack of foresight drove him into oblivion

The record of man's dealing with the passenger pigeon is a bloody one. It will forever be a stain on our account book, and is, in every sense, a tragedy. Much has been written of it, and the subject has been discussed from every angle, but there may be yet those who have not read of the wonderful hosts of these birds which constituted one of the natural wonders of the New World, and how they came to naught.

The passenger pigeon once inhabited a large range. From north central Canada and Hudson Bay it migrated as far south as the Gulf Coast, and west to the Great Plains, occurring all over the eastern and central parts of this country. The nesting grounds were mainly in the northern parts of the United States. In appearance, it was a beautiful bird; the slatey blue of the head and neck and duller hue of the upper parts shone with brilliant, metallic iridescence, while the reddish chestnut of the breast and underparts blended harmoniously with the whole. The tail was long and graduated, the outer feathers white, with black and chestnut markings toward the base. The common mourning dove of today is frequently confused with the passenger pigeon, but although similar in coloration, it is much smaller, and always shows a blackish spot behind the eye which was entirely lacking in its larger cousin.

Perhaps the most interesting feature of this bird's history was its amazing numbers. The accounts handed down by early observers read like fairy tales, but have all been well authenticated. Those great pioneers in American ornithology, Wilson and Audubon, have given graphic pictures of the enormous flocks seen by them, and even before their time, such accounts are to be found. John Lawson, writing in 1709, in his *History of Carolina,* says that the mighty flocks when going to roost, "broke down the limbs of a great many large trees all over these woods—under which their excreta lay commonly half a foot thick", and that "they clear all before them, scarce leaving an acorn upon the ground". Raphe Hamor, writing from Virginia in 1615 makes this comment, "Myselfe haue seene three or foure houres together, flockes in the aire, so thicke that euen they haue shaddowed the skie from us". A Canadian observer once noted a flock which obscured the sun for fourteen hours.

Alexander Wilson once saw a flock in Kentucky which probably takes the palm for numbers. He states that the mass of birds passed overhead in thick layers from right to left, as far as the eye could reach, and from 1:30 to 4 p. m. this living cloud continued without break. The length of this almost incredible procession he placed at two hundred and forty miles, and the width at over a mile. Counting the birds in a square yard, he estimated that the whole flock contained two billion, two hundred and thirty million, two hundred and seventy-two thousand birds. Audubon gives in his masterly style a picture of a similar nature. In the vicinity of Green River, Kentucky, he witnessed a flock coming in to roost, and says that the pigeons poured in with the noise of a gale passing through the rigging of a ship. Many limbs were broken off the trees by the tremendous weight of the alighting birds, and, as they fell, killed hundreds in their crash.

It was at these roosts that thousands of the birds met their fate. When a flock appeared it was the signal for the whole community to turn out, and gunners were much in evidence, besides those with cruder weapons. Fields were baited with grain, and the birds repairing thereto met a slaughter which was fearful. As many as one hundred, and more, were often killed at a single discharge, and this continued as long as the ammunition lasted. As if this method was too slow, the birds were caught by huge nets which were set over baited areas, and sprung when enough pigeons had congregated beneath. This was much more effective than powder and shot, and the birds thus killed were packed in barrels

and shipped to market. It is said that one concern who handled them used fifteen tons of ice in packing one shipment.

It will be readily seen from the foregoing accounts that there was some reason for thinking, as everyone did in those days, that it was impossible to exterminate the birds. And, except for one potent fact, the huge flocks would doubtless have existed for many years. This was the treatment which was accorded the pigeons on their breeding grounds. As in the migrations, the numbers which gathered together to nest were almost beyond belief. They could not but attract the widest attention, and when the fact could be put to commercial advantage, there were many who took what spoil they could.

One of these nesting places near Petosky, Michigan is typical of many. It covered about one hundred thousand acres, the length of the vast rookery being placed at two hundred and forty miles, and the width from three to ten miles. To compute the numbers of the birds would have indeed been difficult, for the nests occupied every available site, scores being in a single tree. The nests themselves were slovenly affairs,—a few dead sticks sufficed to hold the one or two pure white eggs. When the nesting season was on, large parties visited the locality both night and day, and killed the birds until their arms ached. The indifference of the pigeons amounted at times to stupidity, and aided in their own destruction. Trees were cut down with their burden of squabs, while the adults were netted, suffocated with sulphur fires, clubbed, shot, and dispatched in various ways, by a multiplicity of weapons. It is on record that after the birds had been packed for shipment the farmers in the neighborhood turned their hogs loose in the ruined rookery to fatten on the bodies which the packers had overlooked. From one point in Michigan, one hundred barrels of birds were shipped to market every day for thirty days, and, allowing four hundred and eighty birds to the barrel, a fair estimate, this would bring the total to the astounding figure of one million four hundred and forty thousand birds. And there were many such wholesale butcheries.

When such facts as these are faced, it is small wonder that the pigeons did not last. Each year showed a decrease in their numbers, the market slaughter thinning the ranks with speed. In the '90's, reports that pigeons were seen needed verification. Collectors had watched their opportunity, and had taken advantage whenever possible. The end was at hand. At the beginning of this century the passenger pigeon had all but disappeared. Vague reports would be heard every now and then, but investigation showed that all were based upon sight of the mourning dove. To see a live passenger pigeon, one had to visit a zoological park, where some few still existed. It was in such a place that the Finis of their history was written. For many years, the Cincinnati Zoological Park possessed a female which was on exhibition, until, in 1914, this last survivor of a once mighty host passed away.

So ends their tragic history. It is one which reflects no credit to mankind in his treatment of the wild kindred, but we may hope that the lesson has been learned that will benefit others of the furred and feathered inhabitants of this country, and gain protection for them.

The SCHIPPERKE

by Josephine Z. Rine

First of a group of short articles on dogs by this author

SKIP, THE RATTER
This is Max de Veeweyda, who makes his home at the Kelso Kennels at Bernardsville, New Jersey

THE Schipperke was the barge dog, the Little Skipper of Flanders whose work was to rid his floating home of rats. On tiny cat feet, he nimbly made his way around the outer ledges of the canal boats as these nosed through quiet, lazy waters. The sprightly, inquisitive Skip poked into holes and corners, wormed his way through narrow doorways and was everywhere at once, it seemed, in the pursuance of his trade. And his short, high bark was the sharpest sound in all Belgium in those peaceful days when he was such a familiar sight along the canals.

Watchfulness is the hall mark of the tailless tyke. Every minute of the day, he is alert and looking for something. That quality has made him valued through the centuries and still ranks him as one of the best watch dogs extant. He is not friendly to all; in fact, he is offish and not prone to make the acquaintance of those outside the family circle, but for that very reason is all the more faithful to his own. It is no small job to catch a Skip if the Skip determines otherwise. He is never off guard for a moment, and his elusiveness seems to be a part of him.

He is black as coal, his eyes like two shining beads in his fox-like head, and his standing ears turn their widest surface to the fore. His body is square and firmly knit and he carries hardly an ounce of fat. His coat, though fairly short, is so dense that weather means little. He braves heat and cold alike and sheds water as easily as any duck. Built for business—a worker and friend.

Lady Bird! Lady Bird!

by Gayle Pickwell

WHEN winter comes two mighty urges seize the red ladybird beetle of California. One is to go up, up to the highest point within reasonable flying distance, whether up a low foot-hill or the rugged peaks of the Sierra; the other impulse, just as irresistible, is to congregate.

State collectors seized upon these habits of ladybirds and brought them back from their winter quarters in sacks in the spring. Grateful growers released them in their orchards and gardens that they and their woolly, active young might make life less comfortable for scale insects and aphids that destroy the trees and herbs. But this sketch is concerned with the ladybird in winter before the time to "fly away home".

It is possible that the ladybird goes up so that higher altitudes may provide the lower temperatures so generally associated with hibernation. But why this little beetle or any insect here must hibernate at all does not seem clear. In California the valley temperatures provide a day-time weather that any ladybird would find suited to activity, and food is there, too, in the form of insect pests that never leave the growers of the lowlands. But hibernate it does and for a long period. And up it goes.

On a little group of hills a few miles from where the author writes, on the highest point, under the topmost rock, the ladybirds have assembled in great numbers. But, excepting a few scattered in the near vicinity, they are nowhere else.

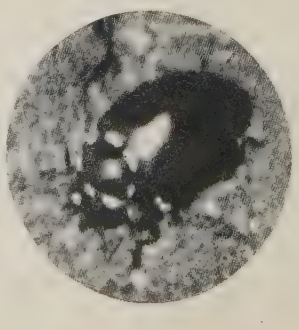
The urge to congregate, while the beetle hibernates, is a powerful one as well. On that topmost hill, near that topmost rock, there are many little tufts of grass—grass enough to provide comfortable quarters so far as roominess goes. But into just one or two of these tufts nearly all the beetles of the hill, excepting those beneath the rock, have assembled. There, when disturbed, they present a writhing, undulating mass of red.

Even those beneath the rock will not be dispersed for long. Several times the big stone has been uptilted for pictures and thus, exposed to light and sun, the beetles, annoyed, have dropped off, scuttled into the grass or have unfolded their underwings and flown away. But when inspected a day or two later, all were back, again huddled tight in masses, enjoying that intangible sensation and protection that comes to animals in aggregation.

A handful was carried to the laboratory with hopes that they would find the black aphids destroying fronds in the fernery to their liking. Black aphids they ignored, exhibiting annoyance at the presumption by filling the air with buzzing beetle wings. Next morning they were found, in spite of a warmed room, high up in a corner of a window, tightly packed in one small red cluster.

For centuries ladybirds have been known and beloved of country folk, and the very name by which they are popularly known alludes to their dedication to Our Lady, back in the Middle Ages. Even the childhood rhyme still repeated by the youngsters had a similarly remote origin. It has reference to the annual burning of the discarded hop vines, in which some of the beetles might still be lingering, for even in early times they were known to prey on the aphids, then as now the pest of the husbandman. Thus from the past have come to us many of our most familiar, though often unexplained, beliefs and common sayings.

Somewhat more than a year ago we had the story of what the ladybird beetle does for the fruit-grower. Now Mr. Pickwell gives a brief view of what the helpful beetles do in their off-season. Above is shown a congregation of ladybirds in winter and below a chap that wandered from the pack



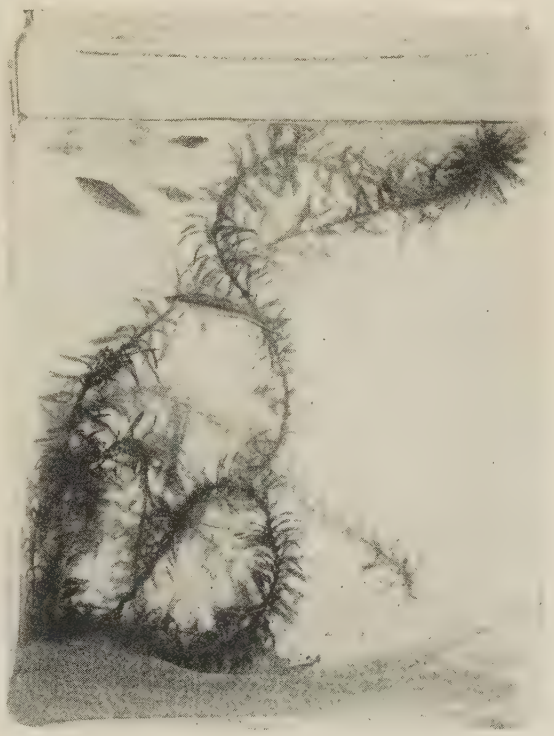
GUPPIES is GUPPIES

Tiny "Million Fish" are Delightful Aquarium Pets

by Eunice E. Myers

MANY PEOPLE who have kept gold-fish as pets with considerable success have never even thought of trying any other kind, and by limiting themselves to the one variety have missed a great deal of the pleasure of raising fish. If you are looking for fish that are healthy, beautifully colored and very prolific, try raising "Guppies", or *Lebistes reticulatus,* if you prefer them by that name. C. J. Heede gives a brief account of them, a part of which may be appropriate to quote here:

".....This interesting live-bearing fish, formerly called *Girardinus guppyi* and *Poecilia reticulata,* was first introduced to fish fanciers in the year 1908 by the German firm of C. Siggelkow. It is a native of Surinam, Venezuela, Trinidad and Barbadoes. They are so abundant in the latter place that they are called the 'million fish'. The English government has distributed them through their colonies as they have proven to be very destructive, like the minnow, to the larvae of malaria-carrying mosquitoes.



TRY GUPPIES FOR A CHANGE
Here are some of the small, interesting and beautifully colored fish

The first time I ever saw these lovely little fellows was ten years ago in the Bureau of Fisheries, Washington, D. C. As they flashed like darts of green and red and blue through the clear cool water, playing tag among the dim arches of lofty sea-green water plants, they made me think of dew drops sparkling on the grass. They looked so happy and at home that I wanted some, just a few, to raise for my very own. It was a long time later before I found where I could buy them for only twenty-five cents apiece. Having had experience with gold-fish, I bought a large aquarium, holding about eight gallons, and after washing some brown sand until it was clean, put a blanket of it about an inch thick in the aquarium. In this sand I planted some water plants taken from a near-by pond and weighted the ends with stones so the plants could take root.

If it is not inappropriate let me say a word right here about green water plants in relation to keeping fish. Most people buy a small bowl and put the fish in clear water, expecting them to live. The smallness of these bowls has a bad influence on the health of its inmates but the lack of growing plants is still more injurious. Besides, how much more attractive the bit of green weed makes the aquarium, providing a background against which the colors of your fish look clear and bright! The real need for water plants, however, is not just for looks but for the oxygen which they supply. Look at the plant closely any sunny day and you will see bubbles of this precious gas rising in little streams from different parts of the plant. These bubbles keep the water from stagnating, and supply the breath of life to your fish.

I planted the watery garden rather thickly at the ends, leaving a clear space in the middle, and poured in the water to within two inches of the top. Then in went five "guppies", three males and two females, and the effect was perfect. The colors were good, the green weed spread softly through the water like a fan and the fish seemed overjoyed with their new quarters. I was delighted with my new pets in their pretty home and when they began to be ten and fifteen and twenty instead of the original five, it was very pleasant indeed. "Pigs is Pigs", but "guppies" are prolific too; the young are born alive and multiply rapidly, one mother fish giving us a dozen young at one spawning when she was not but three months old. The aquarium must be provided with a thick mat of weeds at one side where the babies can hide when small.

The experiment was a success. The water-plants thrived and multiplied, the fish did likewise and in spite of the sediment on the sand the water remained clear and smelled clean. When the fish finally numbered thirty-eight or so, I had to remove some, and introduced some males from a new stock to keep the strain from getting weak. They were not much trouble to care for and could have been made to pay their original cost and that of the aquarium a year after their purchase if I had cared to sell the surplus stock. The pleasure derived from keeping them is not so easy to measure, however; it must be tried to be really appreciated.

The daisy is a popular flower

Dr. Wherry advocates the phlox

GET OUT THE VOTE

Cast your Ballot in American Nature Association National Flower Poll

THE TIME has come, the people said, to think of elections. The quadrennial political wave is now sweeping from coast to coast. Yet strange as it may appear, there are candidates for national honors who are making no speeches, have no campaign funds and want no political managers. They are flowers, and the place they seek is the one beside the flag and the eagle—the honor of National Flower.

The American Nature Association takes great pleasure in inviting the people to participate in a national poll through which the public may register its choice of a national floral emblem. It is taking such action because it believes that participation by large numbers of school children, Nature lovers and members of organizations would serve as a clear test of the popularity of the different flowers, and might function as the first step in obtaining officially a national flower. And it urges everyone to vote either by letter or by the ballot attached to this article.

FLOWER OF FALL

Five states have named it for state flower. Will it be chosen for national honors?

Whatever the national flower might be, it would hardly affect farm relief or change the tariff. Nor would France declare war should the people's choice prove to be the fleur-de-lis. Since the dawn of civilization, however, flowers have been rallying points for sentiment and patriotism. The ancient lotus of Egypt, the rose of England and the lily of China have all been factors, even if unimportant ones, in moulding a racial or national unity. More than one shamrock has been spattered with the red of Irish blood, and many a lily has outlived the reckless knight who plucked and aggressively stuck it in the visor of his helmet. Practically every nation in modern times boasts of some plant symbol except ours,—the United States.

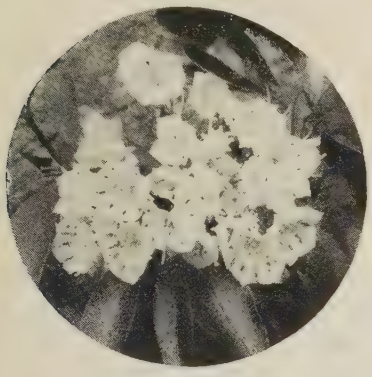
Every state except Pennsylvania has a state flower, and once, in 1889, the goldenrod was elevated to the place of national honor by an indecisive vote. The false propaganda which lays the hay fever sins of the ragweed to the golden blooms, however, has taken away much of its popularity, and other candidates are now seriously questioning its right to any glory. The columbine, popular for its symbolic name and its red, white and blue flowers; the dandelion, cock of the weeds in the lawn; the mountain laurel, of pioneer renown—all these and many others have supporters who believe they are qualified for the highest floral position an electorate can bestow.

Though numbers of candidates are ready and eager for the test, few of them could hope to measure up to the stipulations which should govern the choosing of a suitable flower for such a wide-spreading land. Mrs. Nathaniel L. Britton of the New York Botanical Garden has drafted the platform upon which prospective floral chieftains should run. They must bloom in all parts of the United States and its territories, be available at all periods of the year for floral decoration, be known to all, and be symbolic, in appearance, of the more idealistic and perfect characteristics of this land of the free. One important qualification is that tradition and history must radiate from a suitable choice. It must have its roots deep in the hearts of those who developed the nation. If there are no flowers with such attributes, then those who come nearest to passing the tests should have greatest chance for success.

Dr. Edgar T. Wherry of the Department of Agriculture recently essayed the rôle of Warwick, the King-

THE PIONEER BLOOM

The mountain laurel blooms in the thirteen original states, and was loved by early settlers



THE COLUMBINE

Associated with Columbus and peace, because of its name, it will demand large consideration in the national poll

"QUEEN OF FLOWERS"

Each state, nearly, has its wild rose, considered a symbol of joy. It is England's emblem

maker, in advocating the phlox for the signal distinction. It grows in the national colors, and in every state. It blooms over the Fourth of July. He demonstrates its popularity by stating that he has found it in eighty per-cent of the gardens he has visited, and points to the symbolic quality of its five-pointed star-like flowers. Many patriotic Americans have sought several times to secure the adoption of the mountain laurel as king of American flowers—it was the flower of the pioneers, and closely associated with early history. It is decidedly handicapped, like the mayflower of Massachusetts, however, by its inability to thrive west of Ohio. *Columba,* meaning dove is the verbal ancestor of columbine, one of the most beloved possibilities, which has an excellent following to help it become the peaceful companion of the eagle, and its association with Columbus has given it a great advantage over its fellows. Mrs. Britton appears to be one of the first to favor the rose, England's flower. There are wild varieties of the "Queen of Flowers" strewn from coast to coast, and cultivated varieties are commonly accepted as symbols of joy and happiness. The aristocratic lineage of the plant extends back through the glories of Babylon, Persia, and Nineveh, and has enabled it to find favor in many eyes. It is a dangerous opponent which will not be beaten until the last vote is in.

From Delaware where the peach blossom blows to the home of the Oregon grape, from the Rhode Island hillsides sprinkled with demure violets to the fields of California poppy, the candidates for national flowerdom are displaying their beauty. They all are worthy of consideration, and the duly-elected floral governors of sovereign states—the favorite sons—have excellent hopes of finding their way into the hearts of the people.

Perhaps historians may be able to aid the electorate in making intelligent choices by revealing some of the interesting facts in the rôles flowers played during the era of expansion and settlement. The floral moments of our practical and somewhat unaesthetic ancestors were infrequent, it is true, but there must be stories to be written about some of them. Tradition must help decide the selection. Only the native-born species should be eligible. Each candidate will have to stand on his record, or else go down to defeat.

Most enthusiastic has been the response of Nature lovers wherever the idea of a National poll has been presented to them. They have quickly seen the educational value of such balloting, which will create a new interest in flowers, and make them a significant part of the national life rather than mere addenda to a machine existence. They have pointed out the conservational benefits, and enthusiastically predicted that perhaps by such a medium the public could be instructed in proper care of their wild flowers, and would no longer sally forth of a Sunday ruthlessly to pick and tear them up by the roots. They have been most eager, too, for the children to participate in the voting, for they are the citizens of the future upon whom the success of conservation projects will depend. Not only will this younger generation know their flowers better, and have a more complete picture of the luxuriant Nature wealth of the nation, but, they also point out, the civic pride fostered by voting on a parity with their elders in a campaign in which their opinion will have national significance will make them more interested in citizenship.

There is the sacred lily of China, the edelweiss of Switzerland, the thistle of Scotland, the kaiserblume of Germany—monarchsall. What American flower will be privileged to join this exclusive group? Which best typifies the nation? We hope every lover of flowers that can raise a pen or mark a ballot will register his choice.

NATURE MAGAZINE
NATIONAL FLOWER POLL

Please mark and send this ballot to National Flower Editor, NATURE MAGAZINE, *1214 16th Street N. W., Washington, D. C., as early as possible.*

My choice of flower to be designated as National Flower is .....

* * * *

IF A CLUB OR SCHOOL, PLEASE INDICATE BELOW FLOWERS RECEIVING FIRST, SECOND, AND THIRD LARGEST NUMBER OF VOTES

First Choice ..... **No. Votes**.....

Second Choice ..... **No. Votes**.....

Third Choice ..... **No. Votes**.....

(Signature or name of school or club).....

.....

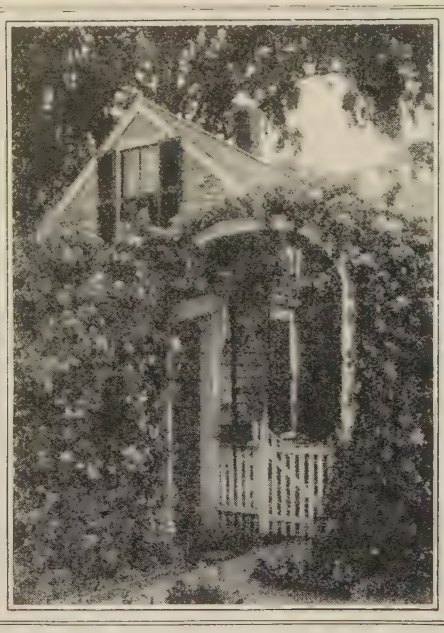
(City and State).....

FIRST PRIZE

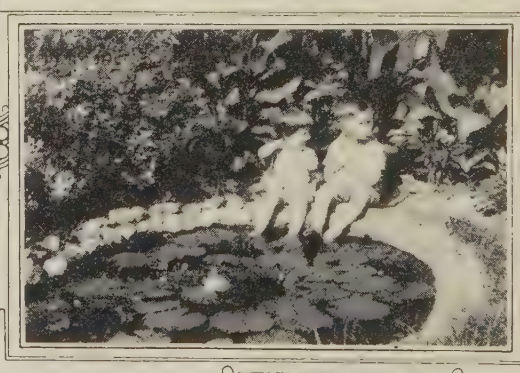
The Garden in All its Luxuriance

HELEN M. GRAHAM
Pasadena, Cal.

WITH the publication herewith of the accompanying pictures, the five prize-winners in the Garden Photographic Contest, the series of Nature Photographic Contests inaugurated earlier in the year is concluded. We were frankly surprised to discover the large number of our readers who use a camera ably. In each contest fine pictures have been submitted. We wish to thank every entrant for his or her interest.



SECOND PRIZE *Garden Gate*
ALBERT KINGAN, Plymouth, Mass.



THIRD PRIZE

By the Garden Pool

MINNIE NEAL
Kansas City
Missouri

THIRD PRIZE *Well Planned Garden*
MAY F. TALLMAN, Janesville, Wis.

THIRD PRIZE *Where Flowers Bloom*
GERTRUDE SHOCKEY, Georgetown, Ohio

LEWISIA and CLARKIA

LEWISIA REDIVIVA
A hardy plant named for a hardy explorer

They Honor the Pioneers

by Leslie L. Haskin

Photos by "The Haskin Studio"

AN INDIAN FOOD
The "rock-rose" root served many savages

When Lewis and Clark started on their memorable trip to the Pacific in 1804, they were instructed to study and observe the plant life of that then unknown region. As a result of these studies they brought back with them a remarkable collection of new plants. When collecting was impossible, they also wrote minute and interesting accounts of all that they observed. They told of the "wappato" or arrow-head, the bulbs of which the Indian women, wading in water up to their breasts, rooted out from the mud with their toes and cooked as we do potatoes; of the "shannetah-qua" or edible thistle, as sweet and delicious as sugar; of the "quamash" with its onion-like bulbs and its blue, hyacinth-like flowers; of the wonderful "quip-quip" or squaw-grass, from which the deft women wove baskets that held water, and might even be used for cooking; and of a host of others.

Meriweather Lewis was the botanist of the expedition. He did most of the collecting, and wrote the chief descriptions, but when Pursh, in 1814, published descriptions of the plants collected, he deemed it fitting that a new genus should be named after each of the two leaders. For William Clark he selected a lovely plant with drooping buds and pink flowers, and called it *Clarkia pulchella*—"pulchella" meaning beautiful. For Meriweather Lewis he chose a tiny, low plant with bitter, fleshy roots, but bearing immense pink cactus-like flowers, and named it *Lewisia rediviva.*

Clark's plant is truly a beautiful flower. It was first collected on the Kooskooskie (now called the Clearwater) River, in the state of Idaho. It is a lover of dry arid soil, and a close relative of the showy evening primrose and the stately fireweed of the eastern states. Its petals are long-clawed and three-cleft, and most curious in form. Since Lewis and Clark's days a number of other species of *Clarkia* have been discovered, and all are becoming deservedly popular as garden flowers, for they are very easy to grow, and lend a wonderful spot of brightness to our annual borders.

The history of Lewis' plant is in some respects quite similar, but far more interesting. The specific name *rediviva* refers to this plant's wonderful powers of retaining and renewing its life. It is perennial, and it seems almost impossible to kill it. It is being brought into gardens, but it is used as a rock plant. Like the *Clarkia*, other species of *Lewisia* have been discovered since the explorers' time. In its native haunts, also, it grows in arid places,—in gravelly soil, on hot dry banks, or even in cracks and crevices in rocky cliffs. It has thus earned for itself the common name of "rock-rose". Among the French it was called "racine amère", but the Indians called it "spatlum", and considered its fleshy tap-root one of their most important food supplies. From the Rocky Mountains to the Pacific Coast, the *Lewisia* is common and well-known, and many trappers and early explorers were glad to use this plant.

In Montana, its abundance, its beautiful flowers, and the traditions of the pioneers who discovered it have so endeared it to the people that it has become, fittingly, the state flower.

CLARKIA PULCHELLA
Truly a beautiful flower, relative of the evening primrose, and popular in the garden

ENJOYING LIFE

The fur seals play happily at the San Diego Zoo, and are very friendly

Rare Fur Seals Rediscovered

Two Specimens Captured By Fisherman

by George H. White

Joy to the zoologists! Happiness to their days! The *Arctocephalus townsendi,* long lost southern species of fur seal, discovered, differentiated by and named for Charles Haskins Townsend, director of the New York Aquarium, has been found again at Guadalupe Island off the west coast of Mexico. Moreover, this time, two admirable specimens were captured alive and taken to the seal lagoons of the San Diego, California, Zoological Gardens, where thousands of persons view them.

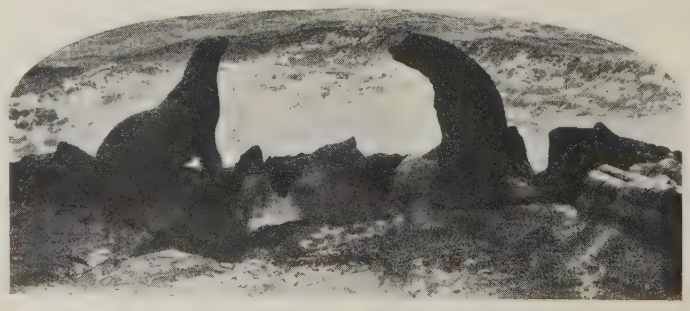
It was in 1892 that Townsend discovered the species at Guadalupe while cruising aboard the United States Fisheries steamer *Albatross* under the auspices of the State Department in quest of information to be used at the Fur Seal Arbitration meeting at Paris. Shortly after 1894, however, the species disappeared not to be seen again until the latter part of April, this year, although the waters about the Guadalupe group are almost constantly visited by fishermen, and frequently by scientists.

Townsend himself revisited the islands in 1911 on a cruise aboard the *Santa Barbara* financed by the American Museum of Natural History, New York Zoological Society and Botanical Gardens, and reported failure to see any of the fur seals that he had discovered there. The rediscovery at this time was made by a fisherman, W. O. Clover, who reported that he saw four of them, and brought two of them to the San Diego Zoo by way of proof.

When scientists visited Guadalupe Island, which lies eighty-five miles southwesterly from the port of San Diego and about seventy miles off the lower California coast, they have always looked for Townsend's southern fur seals in vain. They have occasionally found there, however, the only existing herd of elephant seals of northern species, a larger variety than the southern species. Rigid protection of the elephant seal herd is now being maintained by the Mexican government.

A few days after the seals were brought to San Diego, Dr. Townsend arrived there and readily recognized them as specimens of the species he had first seen at Guadalupe Island. He was greatly pleased with the discovery and capture.

The *Arctocephalus townsendi* conduct themselves differently from the well-known California sea-lions that are trained for circus and stage performance, or from the harbor seals or the big elephant seal in the San Diego Zoo. The fur seals love to roll in the water and ruff their fur, among other things.



CALIFORNIA SEA-LIONS

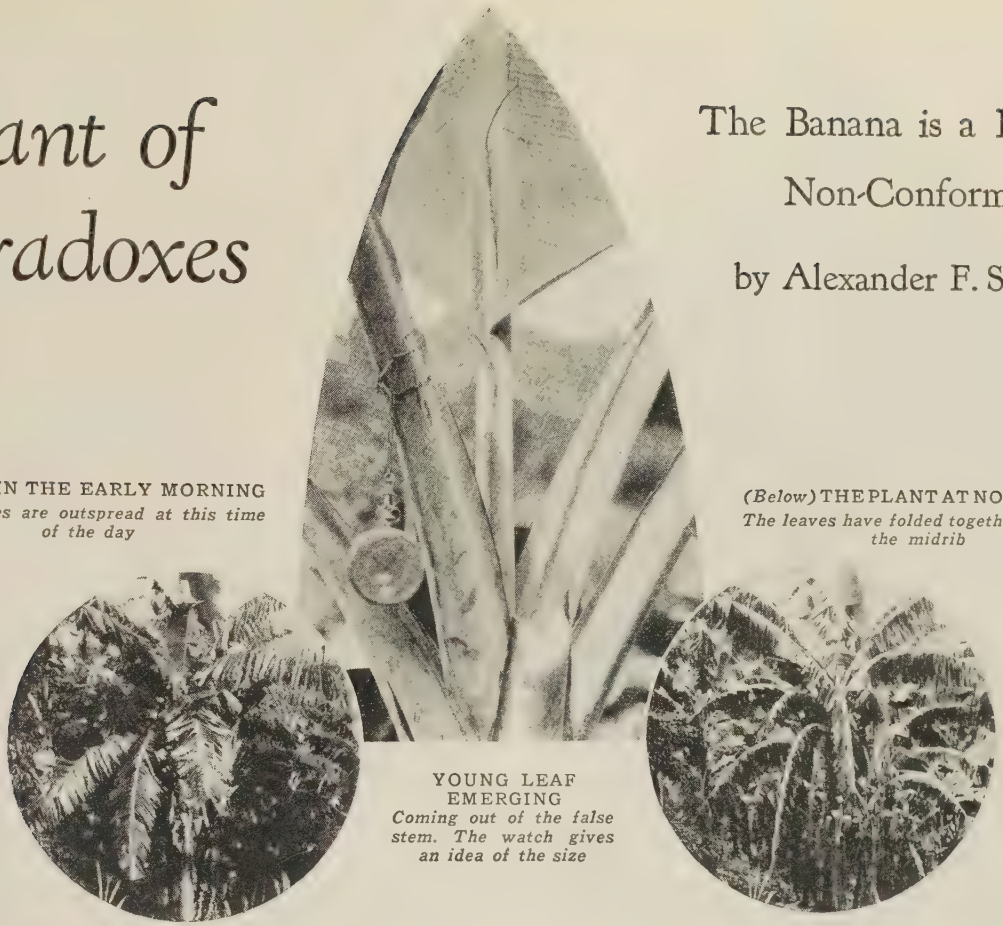
These creatures, trained for stage and circus, are more slender than the fur seals

Their characteristics of build are different, too; they are heavy-chested and thick-necked in comparison. They are now learning to drink fresh water and eat dried fish, requisites of exhibition.

Plant of Paradoxes

The Banana is a Decided Non-Conformist

by Alexander F. Skutch



(Below) IN THE EARLY MORNING
The leaves are outspread at this time of the day

YOUNG LEAF EMERGING
Coming out of the false stem. The watch gives an idea of the size

(Below) THE PLANT AT NOONTIME
The leaves have folded together beneath the midrib

THE plant which bears one of the most familiar of exotic fruits is popularly called a tree, but a leading German authority has termed it a "hapaxanthous giant herb". The banana is, indeed, so different from any plant with which most are acquainted that the familiar names for vegetative types,—tree, shrub, herb and vine,—fail to form an adequate picture of it. And to call it a "hapaxanthous giant herb",—giant herb which flowers but once,—hardly helps. We will, then, call it a "plant of paradoxes".

Our yellow-skinned banana is referred to by planters as the Gros Michel, and is one among the scores of varieties of *Musa sapientum,* for this species, as most other important plants which have been long cultivated, has a bewildering number of varieties. *Musa sapientum,*—"Fruit of the Wise", — Linnaeus called our plant, because tradition has it that when Alexander the Great crossed into India he found the pundits discoursing under the shade of its giant foliage. It is but one of some sixty-odd listed species of the genus *Musa,* all of them confined to the warmer parts of the globe. Bananas grow wild only in the eastern hemisphere, but the edible kinds are cultivated everywhere in the tropical and subtropical portions of the world where climate and rainfall, or irrigation, will support them. Our Gros Michel bananas come almost entirely from Central America and Jamaica, where they are grown on large plantations.

The first paradox about the banana is that it is a tree, by virtue of its size and height, without a true trunk. The tallest banana plants measure forty feet from the tips of the leaves to the ground. In Jamaica they attain about twenty-five feet, the first fifteen feet of which is approximately the remarkable "pseudostem" or false trunk; the remainder, the blades of the huge leaves which tower above it. In the banana the leaf has developed enormously at the expense of the stem, assuming many of its functions. In plants the flower bud of which has not yet begun to develop, what appears to be the stem is made up of leaves alone. Each

ON THEIR WAY TO THE BREAKFAST TABLE
Bananas are carried by truck to the seaport and sent northward on refrigerator ships

THE OLD LEAF WITHERS AND DIES
At the left of the old plant, however, is a sucker which will carry on production

leaf consists of the blade, the short supporting stalk and a long, moderately thin, open cylindric portion known as the sheath. These sheaths fit closely together, one overlapping another, and form the columnar false-stem. The sheaths are soft and succulent like other leaf tissue, and contain large air spaces. The false-stem is entirely without a woody portion, and may be cut as easily as a ripe apple or a potato.

Suppose we remove these sheaths one at a time, beginning with the outermost, which was formed when the false-stem was considerably shorter than now, and so does not reach to the top. Mature sheaths do not continue to grow as the younger and taller ones, which push up inside, add to the height of the plant. Pulling off the sheaths reminds one of removing the "skins" of an onion, or of breaking off the stalks of a celery plant. They are about the shape of a celery stalk, and do not completely encircle the trunk. The false-stem becomes more and more slender as we proceed. After we have stripped away the external sheaths, which are green or various tints of red from the influence of the sunlight, we find that the remainder are a beautiful ivory white, inside and out. When we have torn off these bladeless sheaths, we remove one or two whose old blades are just dying, and then tackle those which end in large, green blades. As these fall away the stem dwindles until it disappears, and nothing is left in the center except a young leaf just pushing up to take its place in the crown. However, if our plant is mature, or almost so, we will find the true stem in the center of the false, of which more anon.

The leaves of a young plant all spring from an underground stem which takes the form of an enormous tuberous bulb, a foot or more thick. This bulb was originally an outgrowth from an older bulb, which either developed in contact with the parent, or was separated from it and planted in another field. It began its life as a bud on the side of the parent stem, like the eye of a potato. The first leaves were scale-like sheaths, but each succeeding leaf to be formed produced a larger blade than the last. The new leaf always pushed up in the very center of the layered structure formed by the sheaths of its elders. Its sheath always turned out to be just a little longer than that of its next older brother, so that when the blade expanded it was at the top of the plant. Finally, when the plant approached its full stature, it became necessary for the sheath to grow to a length of ten or twelve feet in order to reach the top of the false-stem, and spread its blade in the sun and air.

In the larger plants, each leaf has a long journey up the center of the false-stem before it can expand to the breezes. As a cautious shipper, the plant sends out its leaf-blades carefully packed. Each blade is rolled into a long, slender rod, and all in precisely the same manner, with the right margin innermost, and the left margin ending up the coil. But the skyward journey is not without obstruction, because the sheath of the next older leaf entirely surrounds the latest arrival, and closes off its path ahead. To overcome this difficulty, each leaf sets forth provided at its tip with a solid, gradually-tapering appendage much like an awl, which forces the passage through which the more delicate parts follow. Finally the furled blade emerges and stands stiff and stark, like a tightly rolled green shade, towering ten

A BUNCH OF YOUNG FRUIT
Some of the new leaves have not yet been frayed by the wind and are entire

or a dozen feet above the top of the false-stem. Then it unfurls.

Before it can spread out, the blade must tear away from the solid tip, which binds all the turns together, and so prevents the cylinder from unfurling. The tip, which has already performed the service for which it was intended, begins to shrivel and turn brown as soon as it reaches the outer air, but its final detachment from the blade is not accomplished without tearing away the entire right end of the latter for a length of often five inches. This is only the first of many scars which our leaf must suffer before it becomes perfectly at home beneath the tropical sun. While it was still furled up inside of the false-stem it was bordered by a delicate, white or crimson-flushed wing an eighth of an inch wide, which withered and died almost as soon as it came into contact with the air, leaving the blade surrounded by a margin of brown, dead cells. The next wounds are inflicted by the winds. The leaf-blade of the banana would need to be strong indeed to maintain its broad surface intact in the face of the vigorous breezes which often blow over the plantation, not to mention an occasional hurricane. The veins which strengthen the blade all run the same way, from the midrib almost straight to the margin. For this reason it is difficult to tear a leaf along its length, but it tears across, parallel to the veins, very readily, and the wind in the course of a few weeks rips each side into a number of ribbon-like strips. This is our second paradox. A simple leaf has been transformed into a compound leaf! It is interesting to compare the false compound leaves of the banana with the genuine compound leaves of the coco-palm.

The leaf-blade of the banana is among the largest in the world of those plants which have simple leaves. They attain over twelve feet in length, and are a yard broad at their widest part. How puny does an oak, a beech or a maple leaf appear beside this giant!

A BEARING BANANA PLANT

Weak of root, the plant is propped up with a stout bamboo pole to keep it upright

THE NATIVE TRANSPORTATION SYSTEM

A pad of dry leaves serves as a rest for the bunch being brought in to ship

During a warm, bright morning, the leaf,—or the strips into which it has been torn,—folds downward along the midrib, so that the lower surfaces of the two halves of the blade are brought into contact. Most of the pores through which the leaf loses water vapor are situated on the lower surface, and are thus protected, and the amount of water lost is reduced. During the night, or if it rains later in the day, the leaves flatten out again. The difference in the appearance of the plant caused by the change of the leaves from one position to the other is very striking. All the nourishment we find in a banana is manufactured in just such leaves.

Now the stem, which we left in the form of a bulb. For a long while it hardly grew in length between the formation of successive leaves. But now that the plant is becoming mature a change has taken place, and the stem elongates more and more before giving off each succeeding leaf. Thus the true stem pushes upward through the center of the false-stem, just as dozens of leaves have done before it. Ever since it began its existence as a bud on the side of the parent bulb, each leaf produced by the stem was larger than the last, and it is while it is on its upward journey, and between one and three feet high, that it sends out the leaf with the largest blade of all. Although the stem bears leaves along almost its entire length, it would be utterly unable to support them without the support which itself re-

ceives from the sheaths of the false-stem around it. Although the stem is between two and four inches thick over most of its length, it is so weak and brittle that a rather short piece breaks under its own weight. It is a beautiful ivory-white throughout.

When the true stem finally breaks out on the world from the top of the false-stem, it bears at its summit a flower bud which has been forming for a long time. As the stem continues to grow, the weight of the large bud bends it over, and it hangs downward from the summit of the false-stem. Here the fruit is formed. The pendent bud is covered with a series of overlapping, thick, claret-colored scales, as large as one's hand. Beginning at the top of the inverted bud, each scale bends back in turn, exposing a cluster of large, yellowish-green flowers. Flowers under the first scales that turn upward are female, those following both female and male or else neuter, and finally male flowers alone are formed. It is only the female flowers which form useful fruit. The female and male flowers produce short, useless bananas, and the neuter and male flowers fall from the plant, along with the scales, after their period of bloom has passed. Since the bud, after forming a definite number of fertile flowers, goes on until the bunch is cut to produce the sterile flowers which fall, it is eventually separated from the developing fruit by a long length of naked stem, and hangs far below it.

The number of "hands" of fruit to be formed is usually from seven to nine, although bunches with eleven and even more are sometimes found. Each "hand" represents the fruit formed by the flowers beneath a single red bract. The individual fruits are called "fingers". Although the flowers point downward, toward the apex of the shoot, as the fruits develop they bend upward, so that each ripe finger points to the zenith. It is only when the bunch is hung inverted in the grocer's window that the fingers hang down on the stalk, a most unnatural position for them.

From two and one-half to four months after the bud has become visible to the outside world, the fruit has attained its full size, and is ready for the harvest. Even for home consumption, the fruit is cut while it is still green, and allowed to ripen while hanging from the rafters. The bananas one eats in the tropics are not incomparably more delicious than the best one buys in this country, as many people suppose, but on the contrary they taste much the same. It is only when the bunches are cut before the fingers have filled out, as must be done if they are to be shipped long distances under inadequate refrigeration, that fruit of inferior quality is sold.

The bunch of fruit hangs high above reach; to harvest it one cuts down the tree. A native laborer "touches" it with a sharp blow of his cutlass as far up as he can conveniently reach. Then he takes hold of one of the dying leaves which always drape the false-stem, and pulls until the stately crown gives way at the cut, and comes toppling over with a loud swish of vibrating foliage. The laborer catches the bunch as it falls, severs it with a single stroke of the cutlass, and carries it off on his head, as the native carries everything from his lunch to a packing case. The despoiled crown is now cut off four or five feet from the ground, chopped up, and strewn over the field to decay, while the stump is left to give up its stored food to its suckers as it slowly rots away. Some may say,—a wasteful harvest surely, to sacrifice the tree for its fruit! But remember that the banana is hapaxanthous; each plant blooms once and once only. Moreover, despite its enormous stature, our banana is merely a gigantic herb, even as our maize and beans and potatoes. Every mature plant has around it several young plants or "ratoons", which spring from the buds on the sides of the bulb. One or two of the most promising of these are left to form the next bunch of fruit. By means of these a single planting would bear indefinitely, but in culture many considerations make it advisable to dig up the old stools and start afresh after about six years.

This brings us to our third paradox; the banana is a fruit which never contains a seed. Although other species of banana produce seed in the normal way, the common cultivated varieties *never* mature seeds when left to themselves, and this in spite of the fact that on sunny days numerous bees always gather honey and pollen from the flowers, and so the female ones would be pollinated, but the pollen is not capable of fertilizing the ovules from which the seed would be formed. Cultivated plants which rarely or almost never produce viable seeds are not rare, but flowers which mature fruit without having been fertilized are by no means common. The only way to propagate the banana is to cut off the suckers which sprout up at the base of a large plant and, after cutting away all but the bulb, set them out in a field by themselves, just as we cut a potato into pieces containing each an eye, and plant these. In this way all banana plantations are started. The fruit is ready to harvest in about twelve months after a six- or eight-month-old sucker is set into the ground. The ratoons, or sprouts which take the place of the first plant after it has been harvested, require longer, from fifteen to eighteen months, to produce their fruit. Naturally these periods vary greatly according to the soil and climate, and the cultural treatment employed.

One could go on to enumerate other ways in which this eccentric plant is a law unto itself, and radically departs from the generalities which one learns about plants in elementary textbooks of botany. The roots have their idiosyncracies as well as the rest of the plant. Most roots, when they meet a stone or other impenetrable object in their growth through the soil, grow faster on one side than the other and curve around it, but when the banana root encounters an obstacle, it persists in its course until the delicate growing tip is crushed against the barrier and destroyed. Then new roots spring from the sides of the old root just behind the injured portion, and some of these may succeed in evading the obstacle. The main roots are ropelike, and of approximately the same thickness throughout. They do not furnish a very adequate support to the plant, and the heavy bunch, weighing often from eighty to one hundred pounds, must in many districts be propped up with a bamboo pole to prevent its weight's toppling over the tree. Even a moderate breeze levies a toll on the banana plantation, and planters fear the strong gale which often levels the entire crop. The danger of windfall is one of the most persistent with which the banana grower is faced.

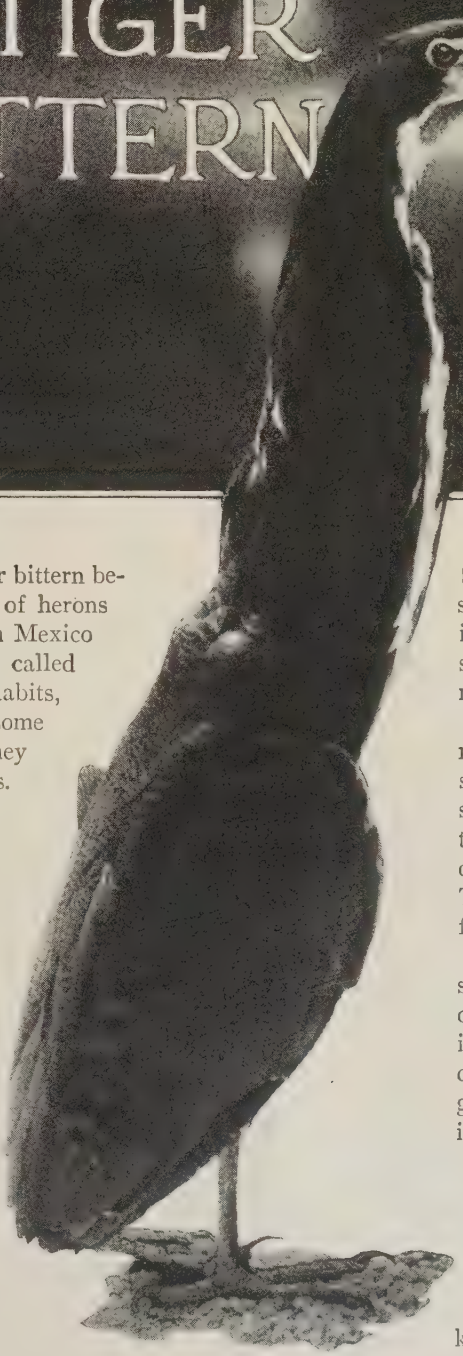
A banana grove is a pleasant place for an evening walk. Let us leave the palm and bread-fruit bordered

road and roam among the aisles between the straight, columnar trunks of the bananas. The giant spreading leaves of neighboring plants interlace above our heads and shield us from the sun's oblique rays, as we pass unimpeded along the clean aisles, in which grow only a few low weeds and grasses. Around us the cycle of the plant's activities is enacted in all its phases.

And so we pass on into a clearing in which the wild sensitive plants shrink away at our footsteps and betray the course which we have followed; pause next to admire the bizarre foliage of a bread-fruit tree, or observe curiously an anolis lizard as he protrudes his brilliantly colored throat pouch impudently in our direction. Being thirsty, we order our barefoot negro boy to ascend the nearest coco-palm for a water coco-nut, from which he deftly cuts away the husk, and then removes one end so that we may drink the clear, refreshing liquid from the inside of the shell as from a cup. Refreshed by the draught, we make our way back to the road, and as we walk along in the deepening twilight the brilliant *Pyrophorus,* with its three distinct lights, commences its nocturnal flight over the neighboring fields, and ushers in the tropic night.

The TIGER BITTERN

by Harry C. Oberholser



THE Brazilian tiger bittern belongs to a group of herons which range from Mexico to Argentina. They are called "bitterns" because in habits, in behavior, and in some cases in appearance they resemble the true bitterns. They have become known as tiger bitterns from the conspicuously streaked and barred plumage of some of the species; but primarily from their strange, loud, startling notes, which much resemble the cry of the jaguar, the "tiger" of the South American natives. They are not bitterns, however, but are herons closely related to our night herons, though somewhat larger.

The tiger bitterns frequent the banks of rivers, the wooded swamps, and the reedy marshes; and they seem not to be rare in favorable localities. They are for the most part solitary, particularly in the woods, and are seldom if ever actually gregarious. The small parties sometimes encountered are probably made up of members of a single family.

Very bittern-like is their habit of standing motionless, with neck drawn in and bill pointing skyward, when lying in wait for their prey. At such times they may easily be approached, even to within a short distance, although under other circumstances they are sometimes rather shy. They live largely on aquatic animals such as fish, as do the larger herons.

When wounded they defend themselves bravely, striking viciously with the bill, which is capable of inflicting an ugly wound. The famous naturalist Latham tells of one of these birds which became tame enough to stay about the dwelling and grounds, where it developed a fondness for hunting rats. It would watch quietly until a rat came within range, then kill its quarry with a lightning-like stroke of its bill. As a rat hunter it soon became as efficient as a cat.

These birds are said to nest in trees, but their breeding habits are little known. The eggs are whitish with small dark markings. How long they incubate, what the young are like, still remain unanswered questions.

MOCK ORANGE IN THE CAPITOL GROUNDS
E. L. CRANDALL

A shrub that lends itself to taming if properly attended

TAMING NATIVE WILD SHRUBS

Many Wildings Help Round Out the Home Landscape Plan

by Albert A. Hansen

Purdue University, Agricultural Experiment Station

WITHIN the cooling shade of most any woodlot that has not been too heavily grazed one may find any number of native shrubs waiting for the opportunity to beautify the home of anyone willing to take the time and trouble to do a little intelligent transplanting. When properly handled, many of our hardy wild species excel both in beauty and hardiness cultivated shrubs, but the job of moving the wildings from their native haunts must be done in the right way or the chances are that the attempt will end in disaster. The reward for careful work, however, is not only the improved appearance of the home surroundings at practically no expense aside from time and labor, but also the thrill and compound interest that is always the result of doing things with one's own hands. When the wild species have been properly tamed, they have a personality and a compelling interest.

When transferring shrubs from the wild, the first and most important rule is,—do not allow the roots to dry! Plants take in their water and minerals by means of multitudes of tiny hairs located at the uttermost tips of the roots. Consequently when the ends of the roots are allowed to dry the delicate root hairs shrivel and die and the shrub perishes from thirst before it has an opportunity to grow new drinking organs. When transplanting shrubs from their natural environment it is a good plan to dig out as much of the root system as practicable, including much of the earth in which the roots developed, and wrap a wet sack around the ball of earth that encloses the precious roots. When transplanted into the home grounds, trim off at least a third of the branches, since this will reduce the evaporating surface of the foliage, will help greatly to prevent wilting and may save the life of the newcomer. A handsome shrub is worth more than a good many dollars in anyone's front yard and is worthy of careful treatment.

Study the natural growing con-

We are glad to announce at this time that a remarkably fine series of garden articles has been arranged for 1929. From a new viewpoint of practical and historic value, these articles will cover the following flowers: Anemone, Aster, Columbine, Coreopsis, Chrysanthemum, Dahlia, Delphinium, Foxglove, Gladiolus, Lilac, Poppy and Sweet Pea

ditions of your wild species and do not wander too far from Nature. In other words, a plant that grows normally in deep shade should not be placed in a situation where it is exposed to the bright rays of the sun from dawn until dusk. Neither should a species accustomed to rich woods soil be expected to thrive in poor sandy or clayey land nor will an acid plant, such as the rhododendron, do its best in sweet land without special treatment.

With these points in mind, the next question is what species of wild shrubs can be utilized around the home grounds? Almost any of the natives have charm and beauty of some sort that will lend itself attractively to home beautification, although some of the wildings stand out among their fellows by reason of unusually handsome flowers, gay colored bark or other desirable characteristics. Foremost among these aristocrats of the wild are, without question, the numerous species of rhododendron that grace the Allegheny highlands of the east and enliven the mountain slopes of the west with great patches of gorgeous rose-purple or white blossoms. With the possible exception of the wild azaleas of the east, rhododendrons are unsurpassed by any wild species and certainly not by the cultivated products of the nurserymen.

The greatest drawback to the cultivation of the wild rhododendron and azaleas has been lack of knowledge of how to grow them successfully. Failure after failure has disheartened many an enthusiast. Recently, however, the scientific investigations of the government botanists have wrung the secrets of growth from these dazzling plants and now anyone can grow them almost anywhere with very little trouble or expense. The research work has shown conclusively that these attractive species cannot thrive except in an acid soil and the secret of successful culture is to acidify and fertilize the soil with aluminum sulphate. Indeed, when soil in which rhododendrons withered and perished was treated with aluminum sulphate the plants grew wonderfully well. The aluminum sulphate can be purchased through dealers in fertilizer and it is applied by dusting over the soil surface and raking it in. It can also be dissolved at the rate of one ounce in five gallons of water and used to water the transplants. Where it is impossible to secure aluminum sulphate, ammonium sulphate, nearly as good, may be used in a similar manner. Azaleas grow naturally under conditions similar to rhododendrons and respond to the same treatment.

E. L. CRANDALL

THE CUCUMBER TREE

This handsome wild tree is a distinguished addition to the landscape

In the northern Allegheny region the finest of all rhododendrons is the magnificent American rhododendron or rose bay, *Rhododendron maximum.* The best of the southern species is the colorful rose-purple Carolina rhododendron, *R. catawbiense,* while the peer of the western representatives is the gay and plentiful *R. macrophyllum* or *R. californicum.*

Among the azaleas, the commonest are the pinxter flower, *Azalea nudiflora,* incorrectly called wild honeysuckle, found growing wild from Maine to Illinois and southward to the Gulf, and the charming swamp or white azalea, *Azalea viscosa,* denizen of moist places from Maine to Florida and westward to the Mississippi.

Growing in company with rhododendron and azalea and deserving of similar treatment with aluminum sulphate is the mountain laurel, *Kalmia latifolia,* and its attractive cousin, the narrow-leaved sheep laurel, *K. augustifolia.* The wild laurels are found in greatest abundance in the Allegheny highlands, although they extend from New England to the Gulf but are rarely found west of Ohio.

Two of the best of our wild native shrubs that are readily transplanted into almost any type of soil are the flowering dogwood, *Cornus florida,* and the beautiful redbud or Judas tree, *Cercis canadensis.* Both of these delightful species were formerly exceedingly plentiful, but they are now becoming scarce due to the depredations of automobilists.

J. HORACE MCFARLAND

THE RED-TWIGGED DOGWOOD

Cornus stolonifera *can be added to the home grounds to advantage*

E. L. CRANDALL

ONE OF THE BEAUTIFUL AZALEAS

They will prosper in soil that is kept sufficiently acid

THE REDBUD PROVES A BEAUTIFUL WILDING IF ONE CAN TAME IT

It is not demanding in its soil requirements once safely transplanted

E. L. CRANDALL

E. L. CRANDALL

RHODODENDRON MAXIMUM

These gorgeous shrubs can now be grown on home grounds

There are still many specimens to be found when the woods are explored away from the beaten track, and certainly to preserve these wonderful plants by cultivation is much to be preferred to destroying them by wanton gathering to suit the whims of thoughtless automobilists who tear the branches in vast quantities for the purpose of decorating their cars or homes. The flowering dogwood flaunts its bright white blossoms throughout the area east of the Mississippi, while the rose-purple flowers of redbud brighten many a hillside from New York to Florida and westward to Nebraska and Texas. Redbud blossoms open early, before the leaves appear, and for this reason the shrub is particularly desirable as one of Nature's earliest and most cheerful greetings.

The list of native shrubs that may be used to advantage in beautifying the home grounds is a long one. Among the species deserving of special mention are rhodora, *Rhodora canadensis,* wild hydrangea, *Hydrangea arborescens,* winterberry, *Ilex verticillata,* fragrant sumac, *Rhus canadensis,* spice bush, *Benzoin benzoin,* southern wax myrtle, *Myrica cerifera,* rose acacia, *Robinia hispida,* flowering raspberry, *Rubus odoratus,* witherod, *Viburnum cassinoides,* American holly, *Ilex opaca,* Oregon grape, *Ilex* spp., wahoo, *Euonymus atropurpureus,* leucothoe, *Leucothoe catesbaei,* fringe bush, *Chionanthus virginicus,* devil's club, *Aralia spinosa,* the red-osier dogwood, *Cornus stolonifera,* and syringa, *Philadelphus grandiflorus.*

Among the plants listed are a number of value during the winter, which is rare among nursery stock. The red fruits of the winterberry and the American holly present a cheerful touch of color against the drab winter landscape, the interesting hanging scarlet berries of wahoo are always a source of delight during winter days, while the reddish bark of red-osier dogwood is a delightful contrast to a background of snow.

There are also a number of wild tree species that can be profitably used, species such as the peerless service berry or June-berry, *Amelanchier canadensis,* the stately chestnut, *Castanea dentata,* the handsome cucumber tree, *Magnolia acuminata,* and various species of fir, spruce, pine, alder, juniper, maple and oak. Many a wild vine can be used to make attractive the bare walls of a garage or to hide an eyesore on the grounds. For this purpose the Virginia creeper, *Ampelopsis quinquefolia,*

E. L. CRANDALL

MANY WILD VINES CAN BE USED WELL

Here Virginia creeper grows luxuriantly and makes a beautiful cover, either alone or in combination

is particularly desirable, while bittersweet, *Celastrus scandens,* along fences, and hops, *Humulus lupulus,* on trellises are attractive and readily transplanted. I once saw a hedge of hops in front of a ranch in Arizona that was one of the finest sights for miles around.

But, after all, lists of plants are of value mainly to show the possibilities of taming wild species to serve our decorative needs. Of much greater value is the initiative that takes one into the country to explore the roadsides and woods for possible additions to our home landscape and select such specimens as may suit our particular needs, although the permission of the owner should always be obtained before the removal of the wild plants. Indeed, it is entirely possible and practicable to lay out a plan of landscaping from foundation plantings to screens, borders, specimen and concealment plantings in which only native wild species will figure and the result would be highly profitable in increased real estate values and greater pride in homes.

When collecting native shrubs for home use, a word of caution is necessary. In some sections, particularly in the vicinities of our large cities, a number of the finest of wild native shrubs are on the verge of extinction due to the depredations of automobilists, commercial plant collectors and others. The cultivation of the endangered species may save them from total extinction and may eventually provide a source of supply for restoring locally extinct plants to their former haunts, but do not transplant rare species to the home grounds and so contribute to their disappearance unless it is the intention to return some of the seeds to the wild.

E. L. CRANDALL

AMERICAN HOLLY TREE

Growing in tame state at Washington's home at Mount Vernon

WILD HYDRANGEA (Right)

This is another wild shrub that can be cultivated with success

ANOTHER RHODODENDRON

It makes a gorgeous shrub and should be tamed for your home

In the past, the lack of success attending the transplanting of wild plants to our gardens has been due largely to our lack of knowledge of the soil and other requirements of the various species. In many cases the ignorance has been a vital factor in the virtual disappearance of attractive species from areas that were well-stocked. Indeed, the ignorance is still wide-spread, and its direful results are apparent to any one who is familiar with the outdoor markets of our large eastern cities. To those who read these lines, however, the acquisition of knowledge that will assure success is an easy matter, and in fact the most potent causes of failure have already been pointed out.

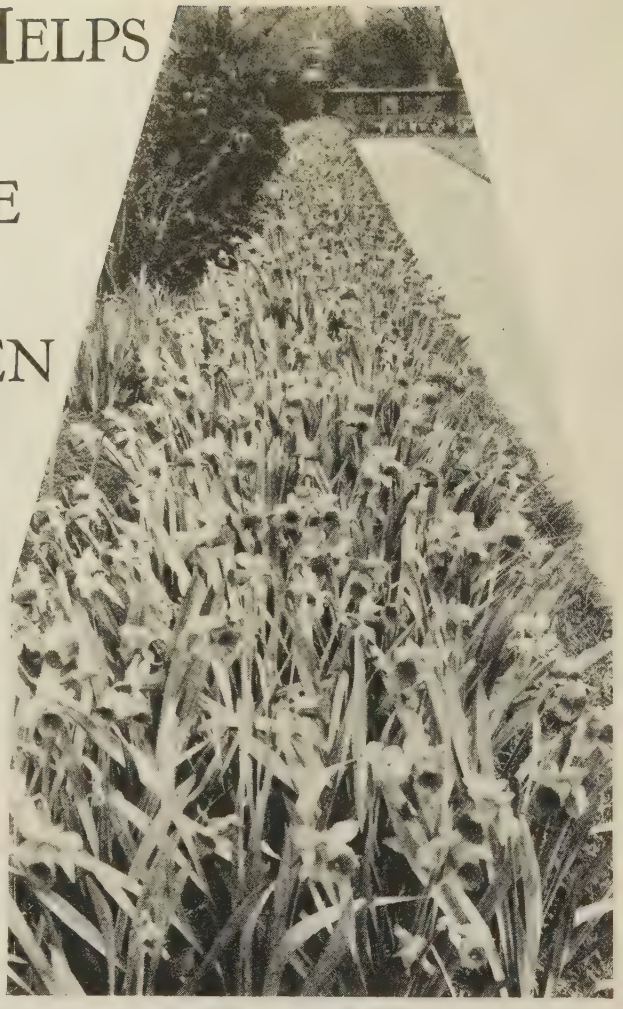
Another point may be worthy of brief comment. Many of our shrubs now in common cultivation are derivatives of our common native species, and not a few that are favorites because supposedly of foreign origin are really individuals of native species gathered in our own forests and exported, and then sent back to us over the ocean.

HINTS and HELPS for HOME and GARDEN

November

by

Harry R. O'Brien



A NARCISSUS BORDER
It is not too late to plant narcissi and other spring-flowering bulbs

E. L. CRANDALL

Do not be in too big a hurry to cover up the perennial border for the winter. Late November or early December is plenty of time. Wait until after the ground freezes hard before you do it. But hill up dirt around the hybrid tea roses before the ground freezes, then mulch after it is frozen.

* * *

If you have delayed doing so, there is still time to plant iris and peonies, tulips, narcissi and other spring-flowering bulbs. Good sized, thrifty clumps of perennials can still be planted safely in early November in the perennial border, especially if it be well drained, and in the rock garden. But do not transplant things from the seed frames. Leave them where they are until spring. This is the month for planting evergreens, shrubs and roses.

* * *

If you are a beginner with narcissi, a good selection to buy for your first planting would include Emperor, Empress, Alba Plena Orcrata, Conspicuus, Rugulosus, Mrs. Langtry, Ornatus, Recurvus, Sir Watkin, Van Sion and Will Scarlet. Two of the best, costing somewhat more, are King Alfred and Van Wavern's Giant. If you have the space for naturalizing, buy a mixture by the hundreds. This will cost around eight dollars a hundred this fall.

* * *

A number of varieties of lilies can be planted either in fall or spring. Some that are included in this class are Batemanniae, Canadense, Dauricum, Philadelphicum, Regale (or Myriophyllum), Superbum, Testaceum and both the single and double tiger lily. Of the few varieties suited for a rock garden, *Lilium tenuifolium* can be fall-planted. This latter, of a rich scarlet color, is one of the gems of the lily family. As for roses—November is perhaps the best month for them. Consult books and catalogs for varieties.

E. L. CRANDALL

LILIUM REGALS MAY BE PLANTED NOW
It is one of a number of lilies that may be put in the ground in fall

* * *

Autumn is best of all the year for planting shrubbery. Then the ground can be worked readily and a good job of planting done. Wait until after a hard freeze has killed the leaves and put the shrubs into their dormant winter state, but don't wait until after the ground has frozen hard. If planted in the fall, shrubs will get firmly established in the ground by spring and will begin their growth naturally and at the

E. L. CRANDALL

AN EXAMPLE OF FORMAL GARDEN PLANTING
Box, evergreens and ericacias planted at "The Causeway", an estate in Washington, D. C.

proper time. Fall planting, with heavy pruning at the time, often means a good bit of bloom the next season.

* * *

If your grounds are to be newly planted, secure the help of a competent landscape architect or the help of the landscape department of a nursery in guiding you to make selections and in planning their location. This will prevent a lot of mistakes. If already planted, there is always room for some more shrubbery. Or perhaps some of the older shrubs that have outworn their usefulness can be removed to give way to some of the newer and better sorts. Plant a shrub as firmly as you would a post. Prune them back early and mulch well for winter.

* * *

Don't be content to plant just the same old-fashioned shrubs that everybody else has been planting the past twenty years. The world is too full of Spiraea Van Houttei and Spiraea Anthony Waterer and the use of the Japanese barberry is sadly overdone. Plant instead some of the great variety of other things available in the nursery.

* * *

Some of the shrubs that ought to be around almost every home are viburnums, including *V. carlesi, dentatum, lantana* and *opulus namum*; a collection of lilacs, species and hybrids; as many as you can of the Lemoine hybrids of Philadelphus including Virginal, Favorite, Norma, Avalanche and Manteau d'Hermine; *Rhodotypos kerrioides*; *Lonicera morrowi* upright; *Deutzia gracilis* and the new purple-leaved Japanese barberry. There are hundreds of others available.

* * *

Then don't forget, either, the broadleaf evergreens. You might well include in this *Mahonia aquifolia, Abelia grandiflora,*—unless you live in the north,—*Daphne cneorum, Euonymus patens,* cotoneasters in variety, *Pieris floribunda* and *Viburnum rhytidophyllum* or the leather leaf viburnum.

VIBURNUMS MERIT CONSIDERATION
A bush of Carlesi which is an attractive shrub for home plantings

* * *

In buying shrubs, go to a reliable, first class nursery, where you will get No. 1, thrifty, well rooted stock. Don't buy from a department store counter or let some nondescript fellow who calls himself a landscaper gardener furnish you stock that he has had heeled in on a back lot somewhere.

* * *

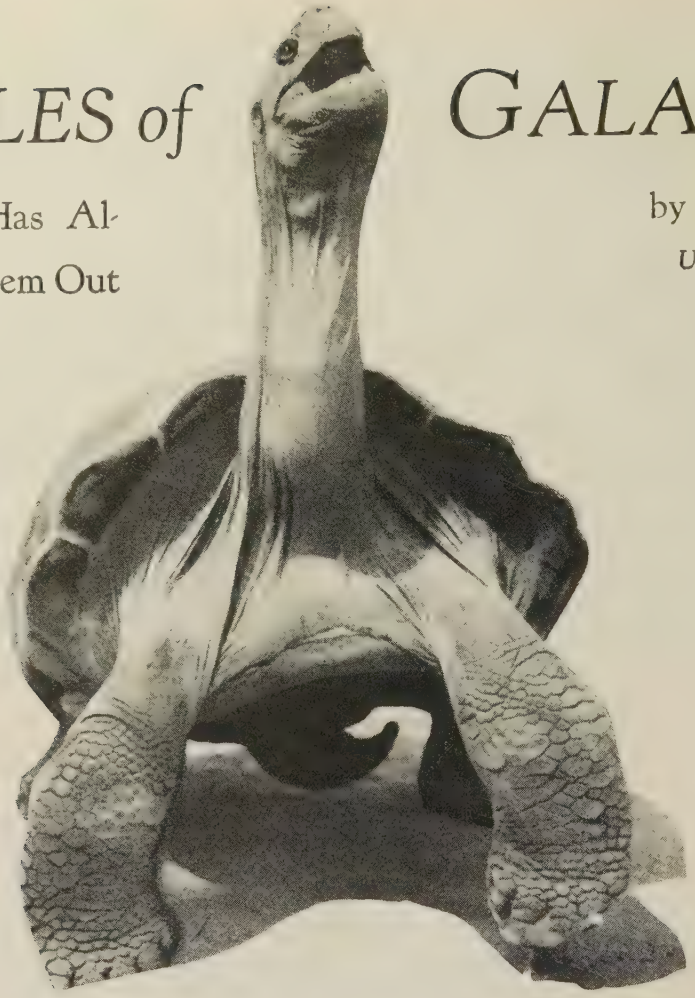
When you come to plant shrubs, have your ground ready in advance. They will keep wrapped in wet burlap until planting time.

TURTLES of GALAPAGOS

Man's Greed Has Almost Wiped Them Out

by Doris M. Cochran

U. S. National Museum



WITH ALL THE APPEARANCE OF GREAT MENACE AND INTENTION TO BITE

Harmless, however, the turtle will shrink into his shell with a tap on his neck

In the southern Pacific, many miles west of the mainland of Peru there lies a clump of islands, the Galapagos group, which once had in abundance the strangest reptilian inhabitants which have yet managed to continue an unbroken line of descent from those gigantic tortoises which roamed the earth in the Age of Reptiles.

The word "Galapagos" is the Spanish word for "turtles", and this group of islands was so named by the original Spanish discoverers on account of the great number of enormous turtles which populated these waterless, rocky and uninviting islets.

Since the days when mortal man first set eyes on these shores, the turtles have steadily diminished until by now the tale of man's greed is almost told, and the turtles are gone from nearly every one of the many islands where formerly the crews of the whaling ships used to bring two hundred in a single day to the shore to be taken aboard. The discovery of such a supply of delicious meat was of great importance to buccaneers and whaling ships, which would often stop off these desert islands and procure enough turtles to last them a year or more. The turtle meat was esteemed as a great delicacy, and the fresh food was a godsend to the sailors, faced with the possibility of contracting scurvy, brought on by an insufficiency of fresh vegetables or meats. The turtles were carried into the ship and laid on their backs in the dark hold, where they could not turn over. Here they lay for perhaps a year or more alive and nourished on their own stored fat and on the peculiar storage-pockets of fresh water which were contained in their necks. In fact, large turtles were sometimes killed solely to furnish a drink of sweet water. In this region without wells or springs or natural fresh water of any sort except that from the rain, a wise provision of Nature allows these creatures a storage-bag for water in their necks, so that when rain water collects in every crevice of the lava rocks, the turtles may drink their fill before it evaporates under the rays of the tropic sun. They then are able to do without another drink of water for long periods, living on what they carry about with them.

Single vessels sometimes took on board as many as seven hundred turtles at one time, this number being easily obtained in a few days' hunt on shore. One of the earlier explorers was Woodes Rogers who visited the islands in 1707. He tells us that "the creatures are the ugliest in Nature, the shell not unlike the top of an old hackney-coach, as black as jet, and so is the outside skin, but shriveled and very rough. The legs and neck are

Miss Cochran is a member of the staff of the Division of Reptiles of the United States National Museum, and her interests in Nature are broad. Her talents include both art and the written word, and she has been a frequent contributor to Nature Magazine

very long, and about the bigness of a man's wrist, and they have club-feet, as big as one's fist, shaped much like those of an elephant, with five thick nails on the fore-foot and but four behind, and the head little, and visage small like snakes', and look very old and bleak. When at first surprised they shrink their neck, head and legs under their shell. Two of our men with Lieutenant Stratton and the trumpeter of the *Duchess,* affirm they saw vast large ones of this sort, about four feet high. They mounted two men on the back of one of them, which, with its usual slow pace, carried them and never regarded the weight. They supposed this could not weigh less than seven hundred pounds".

CARROTS INSTEAD OF THORNY BUSHES

This Galapagos turtle lives contentedly at the National Zoological Park in Washington, D. C.

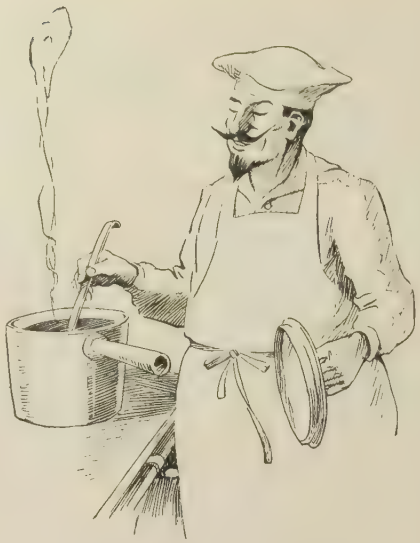
In 1800 Amasa Delano visited the Galapagos Islands, and later published an account of his experiences. He says, "The Terrapin, or, as it is sometimes called, the land tortoise, that is found here, is by far the largest, best and most numerous of any place I have ever visited. Some of the largest weigh three and four hundred pounds, but their common size is between fifty and one hundred pounds. They have a very long neck which, together with their head, has a very disagreeable appearance, very much resembling a large serpent. I have seen them with necks between two and three feet long, and when they saw anything that was new to them, or met each other, they would raise their heads as high as they could, their necks being nearly vertical, and advance with their mouths wide open, appearing to be the most spiteful of any reptile whatever; sometimes two of them would come up to each other in that manner, so near as almost to touch, and stand in that position for two or three minutes, appearing so angry that their mouths, heads and necks appeared to quiver with passion; when by the least touch of a stick against their necks or heads, they would sink back in an instant, and draw their necks, heads and legs into their shells. This is the only quick motion I ever saw them perform. I was put in the same kind of fear that is felt at the sight or near approach of a snake at the first one I saw, which was very large. I was alone at the time, and he stretched himself as high as he could, opened his mouth, and advanced toward me. His body was raised more than a foot from the ground, his head turned forward in the manner of a snake in the act of biting, and raised two feet and a half above his body. I had a musket in my hand at the time, and when he advanced near enough to reach him with it, I held the muzzle out so that he hit his neck against it, at the touch of which he dropped himself upon the ground and instantly secured all his limbs within his shell. They are perfectly harmless, as much so as any animal I know of, notwithstanding their threatening appearance. They have no teeth. They take their food into their mouths by the assistance of the sharp edge of the upper and under jaws, which shut together, one a little within the other, so as

SKELETON OF A DUNCAN ISLAND TORTOISE

This gives an excellent idea of the bony structure of the beast. It is in the U. S. National Museum

to nip grass, or any flowers, berries or shrubbery, the only food they eat".

The supply of turtles was already beginning to diminish when Darwin visited the islands in 1835 during the famous voyage of the *Beagle*. In his Journal, he gives the following striking description of the volcanic islands and their grotesque inhabitants:



"The *Beagle* sailed around Chatham Island, and anchored in several bays. One night I slept on shore on a part of the island, where black truncated cones were extraordinarily numerous; from one small eminence I counted sixty of them, all surrounded by craters more or less perfect. The entire surface of this part of the island seems to have been permeated, like a sieve, by the subterranean vapors; here and there the lava, while soft, has been blown into great bubbles, and in other parts, the tops of caverns similarly formed have fallen in, leaving circular pits with steep sides. From the regular form of the many craters, they gave to the country an artificial appearance, which vividly reminded me of those parts of Staffordshire where the great iron foundries are most numerous. The day was glowing hot, and the scrambling over the rough surface and through the intricate thickets was very fatiguing; but I was well repaid by the strange Cyclopean scene. As I was walking alone I met two large tortoises, each of which must have weighed at least two hundred pounds; one was eating a piece of cactus, and as I approached, it stared at me and slowly stalked away; the other gave a deep hiss, and drew in its head. These huge reptiles, surrounded by the black lava, the leafless shrubs, and large cacti, seemed to my fancy like some antediluvian animals. . . . The *Beagle* proceeded to Charles Island. This archipelago has long been frequented, first by the buccaneers, and latterly by whalers, but it is only within the last six years (since 1829) that a small colony has been established there. . . . In the woods there are many wild pigs and goats, but the staple article of animal food is supplied by the tortoises. Their numbers have of course been greatly reduced in this island, but the people yet count on two days' hunting giving them food for the rest of the week. It is said that formerly single vessels have taken away as many as seven hundred, and that the ship's company of a frigate some years since brought down in one day two hundred tortoises to the beach. . . . They frequent in preference the high damp parts, but they likewise live in the lower and arid areas. . . . The tortoises which live on those islands where there is no water feed chiefly on the succulent cactus. The tortoise is very fond of water, drinking large quantities and wallowing in the mud. The larger islands alone possess springs, and these are always situated toward the central parts and at a considerable height. The tortoises, therefore, which frequent the lower districts, when thirsty, are obliged to travel for a long distance. Hence broad and well-beaten paths branch off in every direction from the wells down to the coast; and the Spaniards, by following them up, first discovered the watering places. When I landed at Chatham Island, I could not imagine what animal traveled so methodically along well-chosen tracks. Near the springs it was a curious spectacle to behold many of these huge creatures, one set eagerly traveling onward with outstretched necks, and another set returning, after having drunk their fill. When the tortoise arrives at the spring, quite regardless of any spectator, he buries his head in the water above his eyes, and greedily swallows great mouthfuls at the rate of about ten in a minute. The inhabitants say each animal stays three or four days in the neighborhood of the water, and then returns to the lower country; but they differed respecting the frequency of these visits. The animal probably regulates them according to the nature of the food on which he has lived. It is, however, certain that tortoises can subsist even on those islands where there is no other water than what falls during a few rainy days in the year".

Since the days of Darwin, the turtles have become entirely extinct on most of the islands, and are very rare in the few restricted spots where they are still known to exist.

There have been numerous expeditions from various museums which have thoroughly studied the surviving remnants of these mighty races. Mounted examples of Galapagos turtles are now on exhibition in the United States National Museum in Washington, D. C. The skeleton of a Duncan Island turtle gives a good idea of the massive bony structure which was necessary to carry such a great weight of flesh over a country so rough and rugged as were the volcanic isles where the turtles abounded. The neck was usually carried in the curved position, but it could be extended to a considerable distance when the turtle reached branches of the thorny bushes which he ate, or paused to regard his surroundings. Like our own box-turtle, the Galapagos turtle carried the weight of his body partly on the tips of his toe-nails, particularly on those of his fore-feet, and his nails were extremely strong and hard and thick for that purpose.

The turtle which has lived in the Zoological Park in Washington, D. C. for many years seems perfectly contented in his grass-filled enclosure, and dines off carrots as contentedly as though he had never been accustomed to a diet of thorns in an arid wilderness where he had to travel miles for a drink.

A PHENOLOGIST AT WORK
Dr. A. D. Hopkins recording the progress of vegetation at Kanawha Farms, West Virginia

NATURE'S OWN WEATHER BUREAU

A Glance at the Little Known Science of Phenology

by Charles Fitzhugh Talman

Ask the next college graduate you meet what he knows about *phenology,* and the chances are ten to one he will tell you he has never heard of it. Perhaps he will ask whether you do not mean phrenology, which is a hundred times more familiar to the world at large, though it is mere moonshine, while phenology is a serious science whose findings are invaluable to mankind.

Although this science is known to few people by name, many of the facts with which it deals must have attracted attention from the very dawn of human intelligence, and today they are matters of universal knowledge. Everybody is aware, from personal observation, that there is a definite order in the happening of numerous recurrent events in the plant and animal worlds. People confidently expect flowers to blossom in the spring and summer, rather than amid the snows of winter, and certain species to blossom earlier than others. There is a well-known succession in the leafing of trees and shrubs. The edible fruits and vegetables are ready for the table at different times through the spring, summer and autumn, according to a program with which all householders are acquainted. The migrations and nesting of each species of bird have their regular places in Nature's calendar. So it is with the various stages of insect life, the hibernating of certain mammals, and several other phenomena of the living world.

PICTURESQUE KANAWHA FARMS LABORATORY
Central station for phenological research near Parkersburg, West Virginia

Everybody knows a good deal about the order in which many of these common events occur; and everybody knows, too, that, while this order is substantially constant, the dates of particular events are by no means the same from year to year. Trees burst into leaf weeks

FAVORITE RECORDER
The horse chestnut is specially recommended for observation by phenologists

(Below)
OBSERVE THE FLOWERING OF THE ELDER
This is one of several trees specially adapted to phenological observations

J. HORACE McFARLAND

THE WHITE OAK
The Indians planted corn when its leaf was "the size of a mouse's ear"

earlier in some years than in others. The first strawberries may be ripe in a certain locality on the tenth of May in one year, and not until the twentieth of May the following year. Robins make their appearance much earlier some springs than in others. There is a similar though usually less striking variation in the times of summer events, while the autumn calendar of biological occurrences is as little tied down to recurrent dates as is that of spring.

Lastly, everybody realizes that these sequences of life events are largely if not entirely a response to atmospheric conditions. The average time when a certain event occurs in a particular place is generally recognized to be a manifestation of the climate prevailing there, while the variations in the dates of any one event from year to year are seen to be more or less closely connected with vicissitudes of weather.

The study of these recurrent phenomena of life and of their relations to weather and climate constitutes the science of phenology. The principles of the science were first definitely set forth by Linnaeus in the middle of the eighteenth century, though the name "phenology", which means literally "the science of appearances", dates back only to 1853, when it was introduced by Charles Morren.

Just as the science of meteorology is based upon records of weather made by a host of observers scattered over the world, so the science of phenology is based upon records of the biological events we have mentioned. While the weather observer takes note of such things as the temperature, rainfall, prevailing winds and the like, the phenological observer records the principal seasonal events in the lives of plants and animals. Generally he confines his attention to a few common species, in accordance with a list drawn up by some central authority. Many years ago there was a large corps of phenological observers in the United States, who reported their observations to the Smithsonian Institution. The most comprehensive record ever made by a single observer was that kept by Thomas Mikesell, at Wauseon, Ohio, from 1883 to 1917, a large part of which has been published by the Weather Bureau. In recent years such observations have been strikingly neglected in this country, but there are some phenological organizations in Canada and several in the Old World. Some of the European records run back a great many years. One, in England, has been kept by the same family ever since the year 1736.

The keeping of a phenological record is a fascinating occupation, and many lovers of Nature have kept such records merely as a hobby, without realizing that their work might be of practical value to mankind. It is now well known, however, that phenology has many valuable applications; especially to farming and other rural industries. Probably it would be much more widely used if it were better known,

Mr. Talman's weather articles that have been appearing in Nature Magazine for several years constitute one of the finest collections of this type of material. This latest article is an interesting and valuable addition to the group. Mr. Talman, who is librarian of the United States Weather Bureau and a frequent contributor to magazines, has probably done more to popularize the study of weather than any other writer who is alive today.

and if more numerous records had been maintained.

A good illustration of what phenology is capable of doing for farmers is furnished by a series of phenological charts of the former Grand Duchy of Hesse, in Germany, published a few years ago by Professor Egon Ihne. Hesse is a small state—about three-fifths the size of Connecticut—but its mountains and valleys are responsible for marked contrasts of climate, so that the types of agriculture suitable in some districts are unsuitable in others. One of Ihne's charts, based on the records of a large corps of phenological observers, shows the normal advance of spring over the country. The date adopted to represent the "arrival of spring" is the average blooming date of thirteen common trees and shrubs, and it coincides with that of the earlier varieties of apple. The country is divided into eight zones, representing successive periods of four days each in the spring calendar. In the zone where spring comes earliest its date of arrival, in an average year, is April 21. At the opposite extreme there is a zone, confined to high mountainous districts, where spring does not arrive until May 20.

WATCH THE CAROLINA POPLAR
The time of the falling of its catkins is a guide to the season's progress

This difference of a whole month in the normal advancement of the season evidently must be taken into account in the selection of crops appropriate for the different parts of the country. There are charts in the collection showing the present distribution of each important crop. From these charts it can be seen that Hessian farmers have, through centuries of experiment, reached merely a rough adjustment of their undertakings to the distribution of climate. With the aid of the phenologists they can now greatly improve this adjustment in connection with the crops already cultivated, and they can also introduce new species and varieties on the basis of reliable knowledge rather than haphazard experiments.

Similar charts prepared for other parts of the world would probably serve a variety of purposes besides that of being directly useful to farmers. Phenological charts showing both the progress of vegetation and the progress of insect activities would be very helpful to entomologists in the work they are doing for agriculture; while, in another direction, charts and data relating to insects would help to safeguard humanity against insect-borne diseases. The phenology of birds (sometimes called "aviphenology") has still other applications. In fact, almost unlimited fields of usefulness will be opened up when the now strangely neglected science of phenology comes into its own.

One especially interesting phase of phenology remains to be mentioned, and that is the use of so-called "guide plants" in agriculture. We have already explained how the average dates of blossoming and other events in the lives of plants serve as a gauge of climate. The dates of similar events in particular years show whether the season is early or late, and how much, and thus show when, in that year, certain farming operations should be carried out.

Long before phenology became a science, farmers discovered that the advancement of the native vegetation in the spring furnished reliable guides to the best time for sowing and planting crops. One old-fashioned rule, probably derived from the Indians, was

ROYAL OBSERVATORY, UCCLE, BELGIUM
Showing the plants from which phenological records are obtained

DR. E. VANDERLINDEN

that corn should be planted when the leaf of the white oak was "the size of a mouse's ear". Several traditional rules of this kind are current among farmers, and one of the tasks of the phenologist is to check them up on the basis of actual statistics. That phenology can also formulate many other rules of the same character is the belief of our leading American phenologist, Dr. A. D. Hopkins, of the United States Bureau of Entomology, who says:

"The results of phenological investigations have led to the conclusion that for every kind of periodical farm and garden practice in which, on account of climatic and seasonal conditions, there is a best time to do the work to secure the best results, there is usually some periodical event in the seasonal development of wild or cultivated plants on the farm or in the immediate locality which will serve as a guide to this best time. If such guide plants do not occur on the farm they can be found among the ornamental trees and shrubs and hardy flowering plants of other localities or countries, and transplanted.

"The periodical event of the falling of the flower catkins of the Carolina poplar has been found to be one of the best guides to the general early or late character of one season as compared with the average; while the opening of the leaf buds and unfolding of the leaves serve as reliable guides to the progress of spring.

"The various magnolias in their succession of flowering events serve as excellent guides to the rate of progress of spring and the time to do various kinds of work. The ornamental spiraeas, deutzias, diervillas, climbing roses and clematis among the ornamentals, and the dogwood, service tree, redbud and oaks among the native trees of the middle and eastern regions of the United States are more or less constant in their responses to prevailing local influences which are indicative of the time to plant certain field and garden crops. The opening of the leaf buds and the flowering of the common fruit trees and shrubs of almost every farm serve as more or less reliable guides to the time to spray for certain insect and plant diseases".

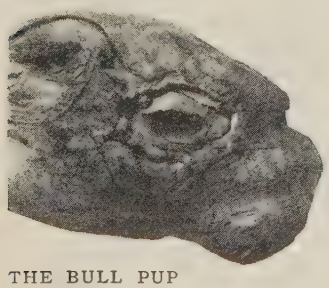
That the blossoming of the shad-bush, *Amelanchier*, is traditionally regarded along the tidewater rivers of the eastern United States as an indication of the right time to fish for shad, and that a victim of hay fever has been known to consult a phenological record in order to dodge the season of irritating pollen in the locality selected for his summer outing are two evidences that phenology is a science of extremely diverse applicability to the problems that beset mankind.

What this science greatly needs is more observers. There ought to be no difficulty in obtaining them, since the task of noting the appropriate events of a few standard plants, birds and insects is not at all onerous. Plants are generally easiest to observe, and a good record of half a dozen trees and shrubs—or even of one—is a real contribution to science.

If the reader should feel inclined to start a phenological record of some of the plants in his locality he might do well to make a selection from the following list, which was drawn up many years ago by Professor L. H. Bailey. The horse chestnut should be included, above all others, if it grows in the neighborhood, as this tree has been recommended for special attention in an international scheme of phenological observations recently launched in Europe. The plants to watch are:

Apple, pear, quince, plum, sweet cherry, sour cherry, peach, choke cherry, wild black cherry, Japanese or flowering quince, cultivated raspberry, cultivated blackberry, cultivated strawberry, lilac, mock orange, horse chestnut, red-pith elder, common elder, flowering dogwood, native basswood, native chestnut, privet or prim, red currant, cultivated grape. The same variety of a cultivated species should be observed every year, and it should be a variety that is neither very early nor very late.

In making the record the following events may be noted: (1) Buds start; (2) first fully formed leaf; (3) in full leaf; (4) in blossom; (5) fruit ripe or fully colored; (6) foliage mostly colored; (7) fully or almost divested of leaves. A simpler list would omit (1) and (2).



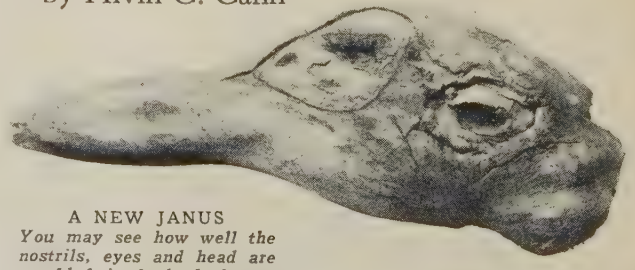
THE BULL PUP

NATURE—*Sculptor*

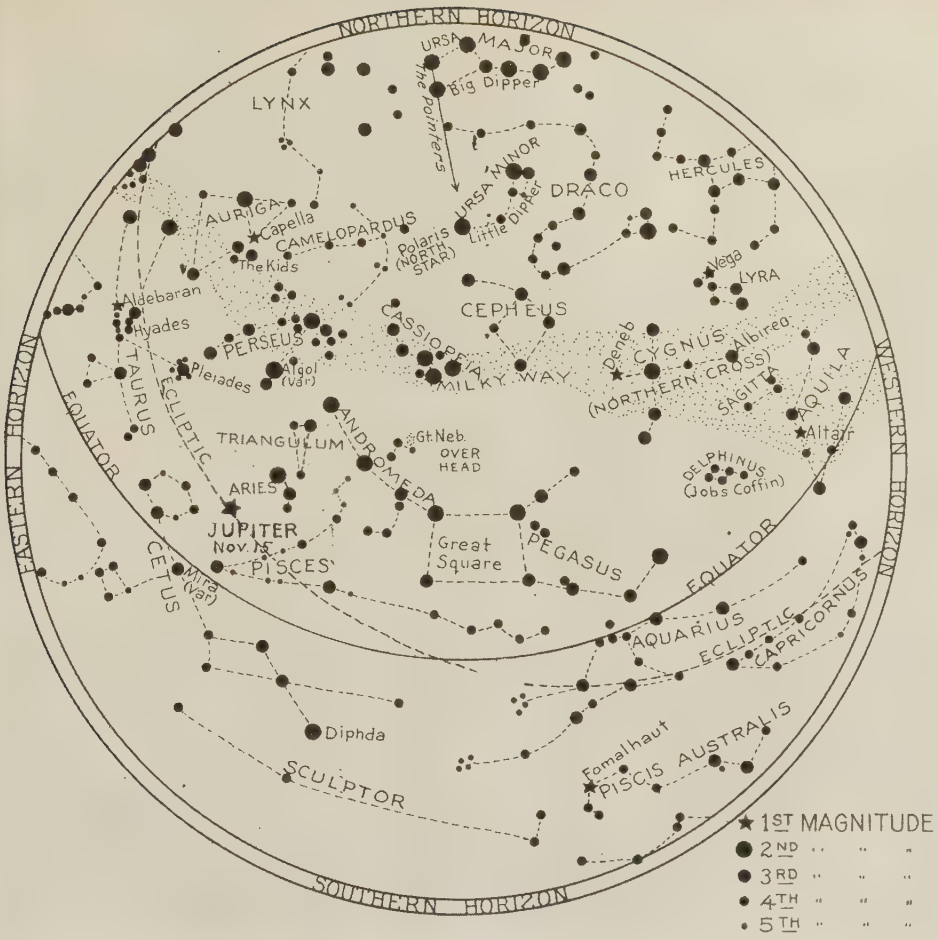
Queer Things She Makes in Odd Moments

by Alvin C. Cahn

JANUS was two-faced, and it was held against him not only during his mythical reign as a mythical god, but also through the ages of history following. But at least his faces were somewhat the same; he only represented man, whichever way he turned. But Nature, in playful mood, carved out a piece of driftwood that eventually found itself in Oconomowoc Lake, Wisconsin, and made thereon both a bull pup and a duck. The duck was perfect—from the strong bill to the arched head and well rounded throat, it was unmistakable. The eye, ear and nostril were accurately placed. The bull pup was as well done and looked quite belligerent and cross. Yet the material was but a piece of old elm root, and the tools but the weather. Again had Nature entered into and excelled at the arts of men, seemingly, without trying.



A NEW JANUS
You may see how well the nostrils, eyes and head are moulded in both duck and puppy



TO USE HOLD OVER THE HEAD WITH TOP TOWARD THE NORTH

This chart is designed for use November 1, 9 p. m.; November 15, 8 p. m.; November 30, 7 p. m.

WATCH NOVEMBER'S SKIES

Moon in Eclipse, Occultation of Mars and Meteor Showers Among the Month's Events

by Isabel M. Lewis

STAR GAZERS will find that many interesting astronomical events are scheduled to take place this month, although to observe some of them they will have to be up before sunrise.

Of greatest interest will be the total eclipse of the moon which is to be visible on November 27 in North and South America, the Atlantic and Pacific Oceans, Australia, the western and northern extremities of Europe and part of eastern Asia. The total phase of the eclipse will last nearly one hour. The moon will first come in contact with the umbral shadow of the earth at 2:24 a. m., E. S. T., when the partial phase begins, and will pass deeper and deeper into it until it becomes entirely immersed in it at 3:33 a. m. This is the beginning of total eclipse which will last for 56 minutes. The moon will not be entirely invisible during this period, however, for its surface will be illuminated by light from the sun passing into the shadow of the earth through the ring of atmosphere surrounding the earth.

Viewed from the surface of the moon at this time the earth would appear as a huge, dark globe surrounded by a thin, luminous, atmospheric ring. The outer extensions of the solar corona would also be seen extending beyond the earth, for it would not hide them completely, though to a much greater extent than the moon does at the time of a total solar eclipse. This is because the earth is nearly four times greater in diameter than the moon. Usually the moon appears to have a coppery

tinge during a total lunar eclipse but at some times the light that it receives from the luminous ring of atmosphere surrounding the earth and also, to some degree, from the coronal streamers, is much less than at other times. As a result the visibility of the moon during a total eclipse varies considerably.

A total eclipse of the moon is not of as great scientific importance as a total solar eclipse but use is made of it in determining the temperature of the surface of the moon by measuring the rate at which it loses heat while it is shut off from the direct rays of the sun. The moon will begin to leave the earth's shadow at 4:29 a.m. E. S. T. and will be entirely out of it at 5:33 a.m.

All phases of the eclipse will occur one hour earlier in Central Time, two hours earlier in Mountain Time and three hours earlier in Pacific Time, so on the Pacific Coast, for instance, the moon will enter the earth's umbral shadow at 11:24 p.m., Nov. 26, will be completely within it by 12:33 a.m., Nov. 27, and will be totally eclipsed in it until 1:29 a.m. when it begins to emerge and leaves it completely at 2:39 a.m. Although total eclipses of the moon are far more generally observed than total eclipses of the sun, since they may be seen from more than half of the earth's surface while a total eclipse of the sun is visible only within a very narrow path of great length, yet they are not of so common occurrence that they pass unobserved or fail to arouse popular interest.

There is also to be a partial eclipse of the sun on November 12 with a maximum magnitude of 81 percent of the sun's diameter covered by the moon. This will be visible only in the British Isles, the greater part of Europe, Egypt and western and central Asia.

The occultation of Mars, which occurs on November 29, will be visible in the northwestern and northern states and in Canada, although in the eastern part of North America it will take place just before or after sunrise. It will not be visible in the southern or southwestern states. It is also a phenomenon for the observation of which the observer in fortunate localities must be up in the early morning hours. The exact time varies in different localities. Jupiter also will be temporarily hidden behind the moon this month on Nov. 25, but only to observers in the south temperate and south frigid zones. The moon is so close to the earth that a change in one's position on the earth's surface may bring into view an object that, to others situated some distance north or south, is hidden behind the moon. An occultation of a star or planet by the moon is similar in nature to an eclipse of the sun by the moon or of the moon by the earth. In other words, an occultation is but a hiding or eclipse of a star or planet by the moon and it may last anywhere from a second to about an hour and a half, depending upon circumstances.

Astronomers who are interested in getting the accurate path of the moon through the heavens are in need of many accurate observations of occultations. These are valuable in fixing its position and here is where even the amateur may help the professional astronomer by observing very accurately the time when he sees a star or planet disappear behind or reappear from behind the moon. In the course of a year there are occultations of several hundred stars by the moon bright enough to be seen with the naked eye but only a small number of these will be seen at any one place.

The two annual periodic showers of meteors due in November are the Andromedes, or Bielids, so-called because they are probably remnants of Biela's lost comet, and the Leonids, which follow in the orbit of another comet, called after its discoverer, Tempel's comet of 1866. The reddish, slowly-moving Andromedes may be seen anywhere from Nov. 20 to Nov. 30, and will appear in the evening hours coming from the direction of Andromeda; the rapidly-moving, bluish colored Leonids will stage their greatest display about Nov. 14-15 and they will come from the direction of The Sickle in Leo, hence their name, Leonids. One will have to be up in the small hours of the morning or before sunrise to see them.

If one wishes to get a glimpse of Mercury this month it will be necessary to rise before the sun and between Nov. 5 and 15 of the month because Mercury reaches its greatest distance west of the sun on Nov. 9 and can only be seen for a few days before and after that date. One should look at about one-third the distance from the east to the south point and not far above the horizon just before sunrise. If found the brilliant little planet will remind one strongly of the beautiful, first magnitude star, Vega.

In the evening sky just after sunset we will find Venus and Saturn. Both planets set in the southwest about two hours after the sun Nov. 15 and are in conjunction on Nov. 6. Venus will then be nearly three degrees south of Saturn. By the end of the month Saturn will be too close to the sun for observation.

Jupiter is now in Aries and in fine position for observation in the evening. As it does not set until about two hours before sunrise it may be seen nearly all night. Mars is now in Gemini and rises somewhat later than the time for which our chart is given. It increases noticeably in brightness during this month. By the end of November it will be excelled in brightness only by Sirius, Jupiter and Venus. Mars is now approaching the earth and is due at opposition late in December. This is not a favorable opposition of Mars, however, as it will be about six million miles more distant than at an average opposition and twenty million miles more distant than it was at its very favorable opposition of 1924. The planet is in a very fine position for northern observers, however, as it is nearly at its greatest possible distance north of the equator and so is high in the heavens when it crosses the meridian.

In addition to the three planets, Venus, Jupiter and Saturn, in the early evening sky, and Mars, rising in the northeast before ten early in November, one should look for the Great Square in Pegasus which is now so finely placed for observation on the meridian with Andromeda adjacent on the east, and Alpha in Andromeda marking the northeast corner of the Great Square. Look also for Deneb, the first magnitude star at the top of the Northern Cross in Cygnus, now far over in the west; for the little diamond-shaped group of Delphinus, the Dolphin, west of Pegasus; for the beautiful Fomalhaut low in the southeast and for Capella and Aldebaran appearing now in the northeast. The Big Dipper is not well situated now, however, but Cassiopeia is brilliant.

DEPARTMENT *of*

NATURE EDUCATION

Dr. E. Laurence Palmer

Cornell University, Director

ASSOCIATES

Prof. George R. Green, *Pennsylvania State College.*

Prof. J. A. Hollinger, *Supervisor of Nature Study, Pittsburgh, Pa.*

Mrs. Elizabeth K. Peeples, *of the Washington D. C. Schools.*

Prof. L. D. Wooster, *Kansas State Teachers College, Hays, Kansas.*

Miss Clelia Paroni, *Supervisor of Nature Study, Berkeley, Calif.*

Dr. Bertha Chapman Cady, *Girl Scouts, Inc.*

Nature Education and Majorities

by E. Laurence Palmer

Majorities and minorities exert considerable influence in the field of Nature Education whether this should be the case or not. Consideration of this may be highly appropriate this November as it may call attention to the futility of determining justice in certain matters by relying consistently either upon majorities or upon minorities as represented by a popular vote, or even by votes of duly-elected representatives.

One is almost inclined to wish that majority votes could influence the laws of Nature. If such were the case, one state might declare that the law of gravity within its bounds should pull to the north. An adjacent state might rule that it should pull to the east, another to the south and a fourth to the west. The Interstate Commerce Commission might permit an exchange of pull between these states so that the problem of superpower might never be a difficult one. Again it might be voted that the sun should shine for longer hours in those states in which the farmers are a power in the balloting and depend upon crops for a livelihood than in those states where the electric lighting companies are entitled to prosperity above all other interests. The more one thinks about the advantages of such a system the more appealing it is except for the realization that it won't work.

If one were to rely upon the votes of communities as determining the truth of the laws of Nature there could certainly be found places where mosquitoes would not carry or could not carry malaria. In fact insects could not be held in any way responsible for disease. Other considerable portions of the electorate might be expected to vote that steel-traps are not cruel if we can judge by the large number of people who profess to be kindly and yet ornament themselves with furs produced through use of the steel trap. Possibly if a referendum of all humans living on the earth were taken we would be compelled to believe that the earth is flat.

In spite of the absurdities suggested above, the people of one of our states will this fall vote "yes" or "no" as to whether it shall be unlawful to teach "that man has ascended or descended from a lower order of animals". The majority rule may determine the lawfulness of teaching the truth about this matter but it will not affect the facts. Again, a larger body of our voters will be influenced one way or another by the suggestion that one state may determine scientifically that a certain percentage of alcohol may intoxicate while another adjacent state may, with equal scientific accuracy, find that that percentage does not intoxicate. The resulting vote will not affect the facts of the case, of course.

Criticism cannot be justly levelled at decisions by majorities alone. A prominent state official of one of our states, obviously not selected for his position because of his knowledge of Nature's laws, not long ago, repeatedly proposed to import into the United States large numbers of game birds from South America to take the place of our diminishing supply of native species. Possibly he believed that Santa Claus would see to it that the young birds which would hatch about Christmas time were provided with a sufficient food supply to get them through the winter.

In New York State this November, deer may be shot in any county in the state except in the very few that have had the persistent initiative to object to the new law and secure protection. This means that in counties where there are not more than a pair or two of deer the breeding stock may be completely wiped out and the deer population for that area hopelessly injured. A representative of the Conservation Department naively suggests that the Legislature can fix it up another year. Religious history tells us of the restoring of life by passing the hands over the dead. Possibly political history may record bringing the dead bucks to life by passing a bill to that effect. Curiously enough those interested in getting protection in certain areas have not found encouragement from those supposedly interested in protection of wild life. It looks like a case of where the passing of the buck will result in the passing of the buck deer population. These conditions have existed despite the ruling of an apparent majority representing at least one county of the state.

It is becoming increasingly evident that the interrelationships which exist between organisms living on our earth are more complex than we ever believed. The public has repeatedly rebelled against the acceptance of facts obviously true to those who have been interested to

(Continued on page 343)

A Giant Fossil Fish

by C. W. Gilmore

Curator of Vertebrate Paleontology, U. S. National Museum

Many million years ago when the western part of what is now the State of Kansas was covered by a great inland sea, it was inhabited by fish of many kinds both large and small. One day one of these big fish swallowed what might just as well have been one of its own progeny,—head, fins, tail and all. It is quite likely he paid the price for his gluttony, for he died shortly afterward, and his skeleton, with the undigested skeleton of the smaller fish within the body cavity, now adorns the walls of the U. S. National Museum, an object lesson to all who view his remains.

Portheus molossus is the name of this giant fossil fish, and it belongs to a group which has long since become extinct. Its former existence in the Kansas Cretaceous Sea was made known through the discovery, in 1925, by Mr. George F. Sternberg, of its fossilized skeleton in the beds of chalk which now cover this region. Chalk is made by the accumulation of microscopic organisms deposited on the floor of the sea until great beds several hundred feet in thickness were sometimes accumulated.

When animals inhabiting this ancient sea died—and there were many other kinds beside fish, such as swimming lizards (Mosasaurs), Plesiosaurs and swimming turtles—their carcasses often settled into the ooze on the sea bottom, there to become covered by other layers of minute organisms until often the skeletons were buried beneath hundreds of feet of chalk and other rock forming materials. In the ages that followed the bones became petrified, the bony matter being replaced, bit by bit, by mineral matter until finally the bones became as hard and enduring as stone itself. With the disappearance of the sea, brought about by the gradual elevation of this whole region, and by the erosion of the surrounding soil by the streams of the present day drainage, the skeletons of these extinct animals are again exposed to view. In brief, it was thus that the cannibal *Portheus* was preserved for the present generation to marvel about.

From tip to tip this specimen measures more than twelve feet in length, and while that figure indicates quite a sizeable fish, others have been found which reached a length of sixteen feet. Although not the largest of its kind, this specimen is of unique interest because it has the skeleton of the smaller fish within the abdominal cavity. This fish, which was not less than four feet in length, was gulped down head first, the caudal or tail fin being plainly visible between the ribs immediately behind the skull.

Paleontology affords a number of instances where the nature of the food habits of extinct fishes has been positively determined. The fossil remains of a fish in whose stomach was the undigested skeleton of a small reptile has been described, and several examples have been found of the extinct ganoid fish, *Caturus*, from the Upper Jurassic of Germany, in which recognizable portions of a smaller fish, *Leptolepis*, have been found. The cannibal habits of certain other fossil fish have also been similarly revealed. Those were wicked days.

(Below) THE SKELETON AS IT IS NOW SHOWN

Parts of the smaller fish may easily be detected

(Left) THE SKELETON AS IT WAS DISCOVERED

The shovel gives some idea of the size of the fish

Photographic DEPARTMENT

L. W. Brownell, Editor

Please give me information concerning the camera and methods used in photographing clouds and sky phenomena.—A. C.

The photography of clouds, either as a separate branch of camera work or for the purpose of securing clouds to print into landscape photographs that lack them, can be done with any ordinary camera but it is generally necessary to use color-sensitive plates in conjunction with the color-screen.

The actinic value of the light coming directly into the lens from the sky is, of course, very great and, therefore the exposure necessary for a fully exposed plate is shorter than in almost any other kind of photography. For this reason a plate of medium speed is best. Those of the slowest speed are apt, when used in conjunction with the color screen especially, to give too hard a negative causing the clouds to look as if they were cut from metal.

For the heaviest type of clouds a slow orthochromatic plate without any filter will often give excellent results. For medium heavy clouds the medium speed orthochromatic plate used in conjunction with a light yellow screen will make the best negative but if the clouds are very light against an intensely blue sky the panchromatic plate with K3 screen must be used if we would render them accurately. We must always consider that the blue sky and white clouds have an almost equal effect upon the ordinary plate and some means of differentiation is therefore called for. By the use of the orange screen and the panchromatic plate the blue of the sky will be rendered almost black and the lightest and fleeciest of clouds will stand out in contrast against it.

Of course we all know that the exposure through a color screen is increased in accordance with the density of the screen. Even with the light yellow screen an exposure of from five to ten times that given without the screen is necessary to a fully exposed plate. Therefore we must always take this into consideration when making out exposures. With a light yellow screen and the orthochromatic plate an exposure of a quarter of a second is, in most cases, sufficient but when the clouds are fairly heavy this may be increased to as much as half a second. When using the panchromatic plate with the K3 filter the ordinary exposure should be multiplied only about four and one-half to five times.

For those wishing to prepare their own screens the yellow screen may be made by soaking a fixed out and well washed lantern slide plate in a solution of tartrazine, about one part in two thousand of water, until the desired density is reached. A cover glass should then be bound over the film side to prevent scratching. A staining solution for the orange filter can be prepared with the following solution:

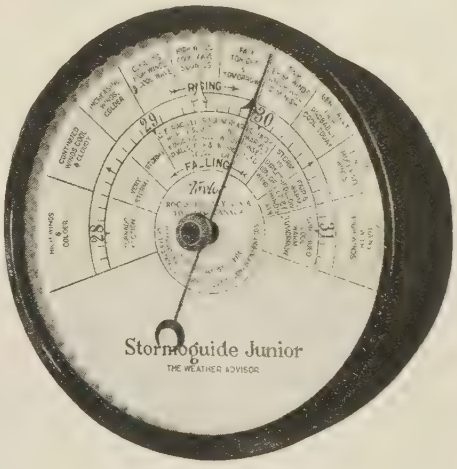
Tartrazine	70 grains
Titan Scarlet	22 grains

This mixture should be dissolved in ten ounces of water.

(*Continued on page 335*)

Taylor Stormoguide

does not control the weather but forecasts the kind of weather to prevail 12 to 24 hours hence and does so with high average accuracy; enables you to plan your work, or your pleasures, to organize every phase of your everyday life so you can take advantage of all kinds of weather, good or bad.



When you know the weather will be fine, you can arrange your outdoor activities; when you know it will be cold, rainy, or disagreeable, you can plan accordingly.

The Taylor Stormoguide is more than an ordinary Barometer. Its convenience in reading is as marked as the convenience of telling time by the clock as compared to the Sundial.

The Taylor Stormoguide Jr. (#2258) illustrated above sells for $10. It has a 4½ inch white dial; mahogany finished bakelite case; glass crystal, good grade aneroid movement; supporting legs and hanger; adjustable for altitudes 0 to 2,500 feet.

Get one of these Stormoguides, interpreters of the language of the weather, from your dealer today. If unable to secure from him, order direct, safe delivery guaranteed. Use coupon below.

Taylor Instrument Companies

ROCHESTER, N. Y., U. S. A.

Canadian Plant,
Tycos Building,
Toronto
Manufacturing Distributors
in Great Britain
Short & Mason, Ltd., London

TAYLOR INSTRUMENT COMPANIES
99 Ames St.
Rochester, N. Y.

Enclosed is $10.
Please send Stormoguide, safe delivery guaranteed.

Name .....

Address .....

City .....

State .....

OWN A BAROMETER—
and Foretell the Weather

This reliable Barometer enables you to predict accurately any change in weather 8 to 24 hours in advance. Scientifically constructed, attractive in appearance. Highly polished mahogany case, silvered metal dial heavy bevel glass front. Size 5½ inches.

An Ideal Gift

Makes a highly prized and lasting gift. Educational, useful and interesting. Indispensable to motorists. Should be in every home. Fully guaranteed; postpaid to any address on receipt of **$5.00**

DAVID WHITE, Dept. 22, 419 E. Water Street
We repair all makes of barometers
Milwaukee, Wisconsin

Wild Bird Food

Now is the time to attract Winter Birds

Purity Bird Food will do it!

Suet cake, Christmas Pudding, Chickadee Highball—35c ea., 3 for $1. Grain, Seed, Nut mixture—5 lbs., $1.10; 10 lbs., $2.

PURITY BIRD STATION
RR-Box 51 Northbrook, Illinois

Magic Eyes $7.95

8 Lenses Magic Eyes that will extend your vision over 15 to 25 square miles. See the multitude of things these powerful lenses will show you. They conquer distance and bring distant objects before your very eyes. Wonderful for hunters, naturalists, tourists, etc.

15-25 Miles

Only 8 Lens Galilean Binocular under $30

FREE TRIAL

Eight fine sparkling precision ground day and night lenses. No wonder they give crisp, clear cut detail, expansive field and great range. Only 4 3-8" high. Fine compass on top. Graduated focusing scale 1 to 12 on middle bar. Case and straps free. Order one today while they last. Only $7.95 C.O.D. **Free Trial for Five Days.** Money back if you want it.

CATALOG OVER 200 GLASSES ALL MAKES—$1—$110

Everything in binoculars, field glasses, telescopes and optical instruments. The finest and largest assortment in America. Catalog gives all information how to choose the best for your individual needs at the LOWEST PRICE

Try America's Leading Binocular House First

DuMAURIER CO. Dept. 811 ELMIRA, N. Y.

BEAN'S
Waterproof Dressing

Made especially for use on my Maine Hunting Shoe. None better for moccasins, work shoes, gloves, mittens, harnesses. ¼ pint, 25c. Full pint can 75c. Write for NEW FALL CATALOG.

L. L. BEAN, 206 Main St., Freeport, Me.

NATURE NEWS AND Views

Bird Census Report

The results of the first year of the migratory wild fowl census which has been conducted by the Bureau of Biological Survey have been very valuable, members of the staff report, not only from the point of view of collecting new bird data, but also in illustrating the public interest and spirit of cooperation is such an enormous task. More than 3000 volunteers, from government departments, conservation organizations, and local, state, and Provincial departments, as well as numerous individuals, engaged in the survey. Canada cooperated with a similar census. The department learned that the birds that breed in Canada and migrate over the United States withdraw into small areas, mostly located along the coasts of the two oceans and the Gulf, or in the lower Mississippi Valley, while only a few seek the interior. Birds, mostly ducks, wintering in Mexico gather into six important areas. The second census will show the relative increase or decrease in the game birds, and will further establish the facts of distribution and abundance, without which suitable legislation could not be enacted. The birds, as last year, will be counted by the volunteers on fixed days. Ducks, geese, swans, and American coots are the kinds being enumerated.

Into Inca Land

A two-man expedition which will travel up the headwaters of the little known Magdalena River of South America, cross the Andes and journey into the mountains beyond Lacunga where the Incas once flourished will start this month when Victor B. McMillan, rancher, and I. L. Philippi, both of Washington State, leave Los Angeles in their little sixteen-foot outboard motor boat. They plan to study and photograph birds and mammals of the region, and also the native Indians, bringing back tales and pictures of the country where the Incas formerly dwelt, and where their treasures are supposed still to be.

English Bird Show

American fanciers are being invited by A. J. Platon, show manager, to bring their caged birds to Europe to compete in the National Show of Canaries, British birds, hybrids and foreign birds which takes place February 7, 8 and 9, 1929. An Overseas Trophy, for which all varieties can compete, will be a feature. He is hoping to make the 1929 show better than last year's exhibit, which drew more than four thousand birds.

Commuting King-Birds

Here are two king-birds, Nip and Tuck. Both of them have crawled in the basket to pose, but Tuck is alone in showing his taste for good reading. They are famous king-birds,—the only two known who regularly commute by bus, and who are habitual attendants at college classes. And it all came about because an ill wind which didn't appear to be blowing any one good blew them out of their nests last spring. Miss Violet Liberty Findlay, supervisor of the Department of Nature Study in the Wilmington schools during the winter, and in charge of Nature Study work at Delaware University during the summer school session, saved them, however, and raised them. All during the summer study period they travelled with her from West Chester, Pennsylvania, her home, and took part in the college classes. Of course, writes Miss Findlay, they slept all during the lectures, but even humans have been known to do that.

To Help Conserve

In order to protect the open spaces, flora and wild life in rapidly-growing Westchester County, New York, from those who would destroy them, citizens have recently organized the Westchester County Conservation Association to help educate the public, to increase appreciation of Nature, and to cooperate with park and game authorities to hasten conservation measures. It is a practical organization of business men and women, urging all proper use of all natural objects. Lectures, newspaper publicity and exhibits will be employed in educational work. One of its principal objects is to revise the law now calling many interesting and valuable forms of animals "vermin". Others are the creation of many wild-life sanctuaries and elimination of unsightly advertisements. It will serve as the conservation representative of Westchester County in national conservation projects with James E. West, Boy Scout executive, chairman of such activity. Such a clear-headed organization has a place in every community, and the work it will do will be invaluable. Its address is 2 Martine Avenue, White Plains.

Book Week

Children's Book Week will start November 11 this year. During these seven days, special programs will be carried on in the high and elementary schools, plays will be given, and prizes offered, all with the aim of inculcating into young students a desire for good reading. Book Week was inaugurated ten years ago by the American Library Association, the Boy Scouts and the American Booksellers Association. The Women's Clubs, the Girl Scouts, the National Education Association, parent-teacher, and children organizations have helped to snowball the importance of this annual observance, and each year sees more elaborate efforts to stimulate a worthwhile activity. This year the National Association of Book Publishers, at 25 West Thirty-third street, New York City, will help planning for this week by distributing upon request pamphlets outlining projects which can be undertaken and by supplying posters. Now for the raid on the libraries.

Wishes to Exchange

Frank M. Carroll, of 815 North Rampart Street, New Orleans, Louisiana, is another member of the American Nature Association who wishes to exchange specimens with other Nature lovers in his region, and to correspond with them.

Hint to huntsmen

PART of every hunter's outfit ought to be a good flashlight. Great guns, Man, there are any number of things you need it for. When you're cleaning your equipment, how do you ever really *see* inside a rifle-barrel without one? How do you *know* your guns are well oiled and protected against rust? Your Eveready will be a true friend-in-need, when you come home after dark, too. A handful of bright light has saved many a misstep on a rough trail.

The flashlight habit was made for outdoor men. Get yourself an Eveready and keep it that way with Eveready Batteries. Endurance is their middle name. They're loaded plumb full of daylight. They're packed to the roof with power. They *must* be, to last so long. Always get genuine Eveready Batteries and you'll get an extra measure of service.

New York's Newest Hotel

The Piccadilly

227 WEST 45th STREET
At B'way—New York

Adjacent to Every Activity.
600 Bright Sunlit Rooms.
Each with Bath, Electric Fan, Ice Water.

Single Room & Bath $3.00
Double Room & Bath $4.50

Exceptional Restaurant & Luncheonette. Wire at our Expense for Reservations.

F. D. SOFIELD, *Mng. Dir.*

A BALSAM PILLOW
from the Adirondack Mountains
makes a most delightful gift. We crowd the fragrance of the forest into a beautiful green, rose or blue silk, hand-painted cover.
1 lb. 8 inches square size is $1.00
2 lb. 11 inches square size is $2.00
Postage prepaid within the third zone include additional for points beyond. No C. O. D. order accepted

CAMP PAYNE
Box 173 Inlet, New York

You will help Nature Magazine to grow by Answering the Advertisements.

Photographic Department

(Continued from page 333)

When one is making cloud negatives for use in printing into landscapes various grades of negatives should be made in order to meet the requirements of the various landscapes with which they are to be used. How to obtain the grades can best be learned only by experience but the wise photographer, desiring to have these negatives on hand for use, should grasp the opportunity to photograph clouds whenever it is presented.

The opportunities of the motion picture in education have long been recognized, but it has been the development of the amateur camera and the easier portability of the equipment that has given impetus to this development. The DeVry Corporation has developed several excellent Visual Education Courses, including Citizenship, Nature Study, World Geography, Vocational Training, Electricity, General Science and Health and Hygiene. In editing the films, the company has enlisted the services of outstanding educators in the respective fields. In the instance of the Nature Study course of eighteen reels, the editing was done by Dr. G. Clyde Fisher of the American Museum of Natural History. Details of these courses may be had from the DeVry Corporation, 1111 Center Street, Chicago, Illinois, or 131 W. 42nd St., New York City.

Home Movies, publication of the Gillette Camera Stores, contains much good advice for the amateur movie photographer. We are indebted to this publication for the following pertinent notes.

Occasionally we stray so far from the beaten track that we leave all electricity behind us, and the only thing we can turn to for light is our automobile. This is especially true in the summer-time. We would take our movies to the beaches, mountains and the like if we only had some way of motivating our projectors. For $125 we can purchase an automobile generator of 110 volts and 600 watts, complete with voltmeter bracket and belt for attaching to the automobile. This outfit may be used on all cars.

Keep your projector aperture clean. A small brush is the best thing to use for this purpose; it can be purchased for 25 cents.

The easiest way to obtain portraits with a Filmo camera is to use a Filmo portrait attachment, a small additional lens that fits on the regular lens. This attachment is also useful in photographing small objects such as flowers, insects, etc. The cost is only two dollars.

A rubber lens cap will help to keep the lens of your camera clean. Dust on the lens can do a great deal of damage and spoil otherwise perfect pictures.

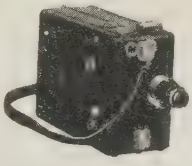
The Filmo owner seeking steadiness will find a camera handle and wrist strap a big help. The handle screws into the threaded hole at the base of the camera and is a good substitute for a tripod.

Bring the World *to* Your *Living Room*

ARM CHAIR travel, that brings vividly before you in *living* pictures, scenes and peoples from the ends of the earth! Nature and natural history pictured to the life.. science . . sport . . comedies . . "features," all this is yours to enjoy with a DeVry home movie projector.

Clear, brilliant, flickerless, full-size motion pictures right in your own living room. What a wonderful gift for the family! Easy to operate; no experience required. Wide variety of subjects, on non-inflammable safety film at reasonable purchase or rental rates. Projector costs but $95.

For personally made movies choose the DeVry Standard 35 mm. camera. Keep a movie diary of your travels, on shipboard, in strange lands, in the clouds — wherever you may be. The DeVry enables perfect movies from the start; simply point camera and press the button. Films may be used on any standard projector. Reduction prints for 16 mm. projectors give exceptionally brilliant pictures. Camera price $150.



For free literature on home movies and complete information about DeVry superiorities write today to

DEVRY CORPORATION, Dept. 11-3
1111 Center St., Chicago, Ill.

DeVry

World's Largest Manufacturer of Standard Motion Picture Cameras and Portable Projectors

NATURE IN PRINT

The Mirror of Youth

A verse anthology which contains Rupert Brooke's *The Great Lover,* Whitman's *Song of the Open Road,* and among many others, the best Nature poems of Keats, Wordsworth, Shelley and Tennyson, has earned the right to be reviewed in *Nature Magazine.* And so we are only too glad to tell our readers that Marian King's *Mirror of Youth, An Anthology of Youth and the Out-of-Doors,* is good for several pleasant hours. While old favorites reign firmly, yet enough of the moderns—Le Gallienne, Sandburg, Teasdale, Kipling, Millay, Housman, and company—are scattered in properly to dilute the ancients, and the spirit of happiness and joy of living sweeps along in steady, all-powerful flow from the opening *Sonnet* by Keats to the rather anti-climactic final, "Shout All Over God's Heaven", which shrieks forth from the page as if the wine of life had intoxicated even the book by this time. Miss King has done a commendable, though daring, thing by adding to her "Golden Numbers" and her strong, joy-giving Nature poems a section of "Fancy, Jest and Jollity" —in short, mostly nonsense verse—where Lewis Carroll, Gelett Burgess, Mother Goose and other famous children's authors mingle with more dignified brethren in a paean of sunshine and happiness,—the book, as we must recall, is an anthology of youth, and not essentially and entirely one of poetry. Nature, Miss King evidently thinks, plays a large part in zestful living, and her collection sings its praises in a great chorus. Try reading it, and if it doesn't make you feel able to climb the highest mountain or swim a mighty river, then you *are* old, after all. It is published by Longmans, Green and Company, Fifth Avenue, New York, at $2 the copy.—P.F.H.

Tropic Trails

There's a lilt, and a swing, and a lure of tropical seas in the collection of poems now gathered together into a little book called, *Songs of Tropic Trails* by Col. George Warburton Lewis. More than one of the sonnets are reminiscent of William Ernest Henley and some shorter poems recall the Kipling of those early *Barrack Room Ballad* days. But through it all there is a distinctive note that is Col. Lewis' own. These countries that Lewis knows so well, and sings so well about are virgin lands for the poet. Haiti, Porto Rico, Nicaragua and Panama,—those colorful places so saturated in romance, so often visited by adventurous yesterdays, have strangely enough remained unsung until now. And Lewis has caught bits of the glamour and wistfulness and some of the mystery and color of these lands and these people and has woven it all together into a little book of graceful and melodious verse.

On Keeping Bees

Beekeeping is the latest volume added to the Rural Science Series in a revised edition by The Macmillan Company. It is written by Everett Franklin Phillips, Cornell University, and in the new edition the more essential details of beekeeping knowledge have been brought up to date.

The Natural Life

According to the statement of the publishers, *Long Lance* by Chief Buffalo Child Long Lance "will arouse a twinge of jealousy in the heart of many a white reader". This jealousy is supposed to arise from envy of the life of the Indian as it was. We admit we were jealous. We think you will too, once you have roamed the plains with this band of Blackfoot Indians, lived their life and learned their joy of living through the pages of this book. Chief Buffalo Child is a college graduate, soldier and athlete, who put aside an appointment to West Point to serve in the Canadian Army in the World War and there to win wounds and honors. He returned to a newspaper career and was finally persuaded to write the story of his tribe and the other tribes he knows. He has told a fascinating tale, full of romance, struggle, bravery, fortitude and Indian lore. It is finely and simply written, a valuable history of a life that has virtually passed. The volume is brought out by Cosmopolitan Book Corporation and is listed at $2.50.

A Real Thrill

Possibly *The Island of Captain Sparrow* by S. Fowler Wright does not come particularly within the bounds of this department and the type of book we are accustomed to review in it. We cannot, nevertheless, refrain from commenting at least briefly upon this most entertaining and diverting novel from the author of the popular novel *Deluge.* In this latest story the author has selected as his canvas an island in the Pacific, teeming with a flora and fauna that is the product of a most vivid imagination, and yet which has no small basis in fact, since much of the wild life is similar to that which has now been classified as either extinct or fabulous. We confess that we lost the better part of one night's sleep with the *Island of Captain Sparrow,* being unable to leave it until we had finished it. Anyone who feels he would like an imaginative novel, full of thrilling adventures in an imaginative wilderness, will be doing himself an injustice by not reading this book. It is published by the Cosmopolitan Book Corporation.

Scenic Verse

More than two hundred verses of the out-of-doors by Willis Hudspeth have been collected in a little booklet published by the Colonial Press, 17th and Webster Street, Omaha, Nebraska. The collection appears under the title *Sketches of the Out-of-Doors* and they testify to a wide travel and sincere reaction to the beauties of Nature. The book sells for one dollar.

Our Contemporaries

Eclipsing all mere man-to-man wars in its duration and its scope is the war between man and insect pests. It is an economic battle of tremendous importance and man is waging a militant fight against a numerous enemy. In the September issue of *The Scientific Monthly,* Dr. H. T. Fernald reviews the progress of this fight over the past three-quarters of a century in an article "Insects: The People and the State". This is only one of several interestingly presented scientific articles in this excellent publication.

In the August issue of the *Journal of Mammalogy,* quarterly of the American Society of Mammalogists, Ernest P. Walker discusses the problem of "Getting Public Support for Mammal Protection". Declaring that "the crying need of the present day is to protect and build up the stock of most of our animals", he points out that less killing is the obvious means and that self-interested people can be induced to recognize this if "we can show them that it will be money in their pockets to do so". Mr. Walker supports his argument with the facts of vital significance.

The leading article in the July-August issue of *The Condor* is written by C. T. Metzger and entitled "Saving the Parrakeets". For some years a number of species of Australian parrakeets have become progressively less abundant to the point where today they are tremendously difficult to find. This Mr. Metzger has noted, as have other aviculturists including Lord Tavistock, Havant, England. The latter offered to donate a number of pairs of birds in his possession to responsible breeders in this country, feeling that more could be accomplished here than in England. This was done through Mr. Metzger and thus far the experiment gives every indication of success. We are particularly interested in this endeavor since it was to us that Lord Tavistock, a member of the American Nature Association, first appealed, and through *Nature Magazine* the matter was first called to the attention of aviculturists in this country.

For Rock Gardeners

One of the handiest of best presented groups of books for the amateur gardener is the set published by Macmillan under the group title of *The Home Garden Handbooks.* They are written by F. F. Rockwell, well-known for his horticultural writings. The latest to come from the presses is entitled *Rock Gardens,* and tells the story of this type of garden for the individual whose home grounds may be small but may, nevertheless, contain a rock garden. It is well worth the dollar asked for it.

Recreation Report

Without any fanfare of trumpets the National Conference on Outdoor Recreation has been functioning, quietly gathering together from various sources facts on recreation with relation to parks, forests, industry, museums and federal lands. These have been compiled in a report published as Senate Document No. 158 of the First Session of the 70th Congress.

North Pole Flier

Says:

"During our Arctic flight and on our journey afoot over the polar pack ice, I found your

MIRAKEL

VEST POCKET BINOCULARS

5 Power
5 Ounces
$25

7 Power
6 Ounces
$35

to be of the greatest value and assistance to us."

CAPT. SIR GEORGE H. WILKINS

Also used by:

Richard E. Byrd, Knud Rasmussen, Vilhjalmur Stefansson, Frank Chapman, Robert Cushman Murphy, Ernest Thompson Seton, William L. Finley, etc.

Seeing is Believing

MIRAKEL DISTRIBUTORS
1214 Sixteenth St., Washington, D. C.

Used & New Field Glasses

Pocket size prisms in 3½, 4, 5, 6, 7 & 8-power, 3 to 12 oz. weight; $16 to $35. Zeiss, Hensold (including "Dialyt"), Mirakel, Busch, Schutz, Lemaire, Ateo, Colmont and Megaphos. Galilean or "field glasses", $3 and upward. **Satisfaction guaranteed.** Sent on approval.

J. ALDEN LORING
Box K O-we-go, N. Y.

Mount Birds

Learn at Home by Mail

Be a taxidermist. Learn to mount BIRDS, ANIMALS, GAME HEADS, FISH. Wonderful fascinating new art. All secrets revealed. Easily, quickly learned by men, women and boys. Decorate home and den with nature's finest art. SPORTSMEN save your trophies. BIG PROFITS for spare time. Sell your mounted specimens and mount for others. Have a business of your own. Big demand, high prices. Learn from old reliable school, 20 years' experience.

FREE! Beautiful illustrated book, "How to Learn to Mount Game", with dozens of photos of mounted specimens. Yours for the asking — FREE — Write Today. Taxidermy is a NECESSITY for sportsmen and nature lovers — INVESTIGATE. Get this wonderful FREE BOOK NOW — no obligations. Write! Don't delay Send Coupon Today—NOW!

FREE BOOK COUPON

N. W. School of Taxidermy
2948 Elwood Bldg., Omaha, Neb.
Send me your free illustrated book "How to Mount Game." Also tell me how I may learn this fascinating art easily and quickly by mail. No obligation.

Name _____

Address _____

Buy Direct at Dealer Prices

Wire Netting at Wholesale

A big saving on wire netting in all sizes for any type of bird or animal enclosure. Wholesale prices and prompt delivery from our large stocks at Clinton, Mass.: Chicago, San Francisco, Seattle and Minneapolis.

Free Catalogue on Crown Pen Materials

Crown Iron Works Co. 1253 Tyler St., N. E. —Minneapolis

Rippling Mountains

A theory that the mountains of eastern United States had the habit of opening out and shutting together like an accordion is advanced by Mr. Charles Butts of the United States Geological Survey. Studies reveal, he points out, that the Appalachians were alternately under the ocean and exposed to the air, in the Paleozoic Age. The crust has gently, imperceptibly,—to humans or their ancestors,—oscillated back and forth, causing continual shifting of land and sea areas. That this rocking of the crust may still be going on is perhaps indicated by the slow sinking of the New Jersey coast, believed to be now taking place.

Santa Cruz Flower Lovers

To beautify the city of Santa Cruz, to disseminate Nature knowledge by lectures and exhibitions, and to promote conservation of wild flowers and bushes—these are the purposes of the one hundred forty members of the Santa Cruz Flower Lovers Club, which was started in 1927. This year it has conducted three exhibitions, and progressed considerably in its project to gain support for the upbuilding of De Laveaga Park. Though young, it is a vigorous infant, and in such a flower-strewn country as that in which Santa Cruz is situated, bound to succeed and grow stronger.

A Romance Spoiled

A Nature sequel to *Love's Labour's Lost* was dramatized in Yosemite National Park one bright moonlight night last summer, when Old Bill, the Park's largest bear, crept up behind a lass and her swain sitting on a garbage can platform, and sent them flying toward different destinations with a well-directed growl. The evening was beautiful. Romance was in the air, even above the garbage can platform. But Bill, the king of the local bruins, who makes a nightly round of the scrap-containers, was on business. There was no sentimentality in his make-up, no human yearnings. He just told the couple what to get off—and they did.

Nature Radiocast

California's Nature has taken to the air. Facts and figures relative to the fauna of the state, pleas for conservation and protection of diminishing numbers of animals, stories of the great natural resources of California, all will be radiocast once a week under the direction of H. C. Bryant, head of the Bureau of Education of the Division of Fish and Game, and a series of speakers who are authorities on their subjects have been scheduled for consecutive Thursday evening programs. One of the first talks, given by Bryant, discussed the qualifications of the different candidates for the honor of being chosen the state bird.

At Last

Eugene Feuchtinger, A. M.

A Voice Teacher Who Actually Guarantees Results!

SURPRISING! Yes. Unheard of! Yes. Yet that is what Prof. Feuchtinger offers to do for ambitious, determined voice students who come to him for guidance. Never before has any voice trainer made such an offer.

But, Eugene Feuchtinger in his quiet way, has followed this practice for many years. His students number many thousands. And every one of them has enrolled under the positive guarantee of at least 100% improvement or every cent of tuition will be refunded. In all these years, less than one-tenth of one per cent have asked for a refund—and these few have received it without quibble or delay.

What is there in this teacher's method that enables him to offer such unprecedented terms?

Scientific Methods!

Eugene Feuchtinger does not devote his efforts merely to teaching you how to sing. He actually develops the voice! Not by singing monotonous and tiresome scales that weaken and destroy your latent vocal powers. Rather by teaching you to build up the strength and elasticity of your vocal organ by scientific muscular exercise.

These exercises are silent. You may practice them in the privacy of your own room. You may live thousands of miles from your teacher's studio. Still, with surprising rapidity, you will notice that your voice is becoming stronger—richer—more beautiful every day.

Physical Voice Culture Book FREE

Your voice has marvelous possibilities that you may not even suspect. "Physical Voice Culture" will reveal them to you. Send at once for this valuable, beautifully illustrated book. Read the astounding *true stories* of what others have done. Learn how to build up a strong, beautiful, magnetic voice and all about Prof. Feuchtinger's wonderful guarantee offer. Write today!

Perfect Voice Institute
1922 Sunnyside Ave., Studio 16-78 Chicago

Perfect Voice Institute, Studio 16-78
1922 Sunnyside Ave., Chicago, Ill.

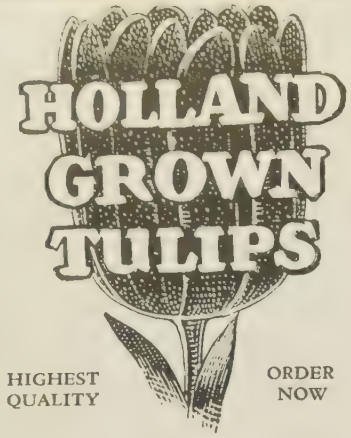
Please send me, FREE and without any obligation, Prof. Feuchtinger's new book, "Physical Voice Culture." I have checked the subject in which I am most interested.

☐ *Weak Voice* ☐ *Stammering*
☐ *Singing* ☐ *Speaking*

Name _____

Address _____

City _____ *State* _____



HIGHEST QUALITY — ORDER NOW

BRILLIANT COLORS
Selected Top-Size Bulbs
Absolutely Guaranteed or Money Refunded

CABLEGRAM
NOORDWYKERHOUT HOLLAND
HOLLAND BULB CO
NEW YORK CITY
PRICES OF TULIPS GOING UP TREMENDOUSLY STOP OFFER NEXT SHIPMENT AT THREE FIFTY AND FOUR DOLLARS PER HUNDRED
HOLLAND BULB CO.

Stupendous Offer
Special For This Month Only

We offer our first shipment of 500,000 Selected Top-size Darwins at a ridiculously low price. They are going fast. Order now. You may never have this opportunity again. Order as many as you can use. Tell your friends about this wonderful offer.

Buy Direct From Growers and Save Dealer's Profit

GIANT DARWIN TULIPS

POSTPAID ONLY

1000	100	50
$25.00	$2.75	$1.50

Wm. Copeland, violet.
Clara Butt, beautiful rose.
Painted Lady, creamy white.
Pr. Elizabeth, deep pink.
Faust, satiny purple.
Pride of Haarlem, brilliant carmine.
Inglescombe Yellow, yellow.
Harry Veitch, deep red.
Prof. Rauwenhof, cherry red.
Sieraad Van Flora, bright red.

Hyacinths per dozen.... $1.00
Narcissus per dozen.... $1.00
Giant Crocus each 2½c
Single, Double Early Tulips each 3½c
Breeders each 4c
Cottage Tulips each 3c

Shipped 5 varieties in boxes of 50 bulbs; 10 varieties in boxes of 100 bulbs. Separately packed and labeled. No order for less than 50 Darwin Bulbs accepted. ACT AT ONCE. YOU WILL NEVER REGRET.

HOLLAND BULB CO.
Dept. N, Box 233
Gen. Post Office, New York City

Healthy Porch Flowers
Raise perfect porch flowers and plants. The Perfecto Flower Box has patented system for feeding water properly at roots and circulating air through soil. Satisfaction guaranteed. Four sizes in old ivory and green. 26 inch size sent prepaid for short time for only $2.50. Extra postage West Miss.
METAL EGG CRATE CO.
365 Wolfe St. Fredericksburg, Va.

Study Flower Growing

A course in flower growing for both commercial florists and flower-lovers which will teach plant-growing, green-house practice, and aesthetics has been introduced into the winter schedule of the College of Agriculture, Cornell University. A study of soils and fertilizers will be included. Gardeners and vegetable growers will also receive instruction in the care of their plants. O. W. Smith, at Ithaca, New York, is registering students for this course.

Eye-Minded Humans

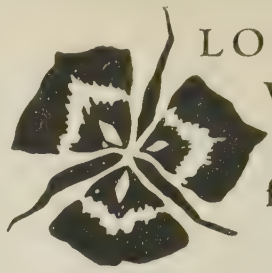
A tiger sees the same world as man, but the world of dogs and horses is probably much different, according to Professor George M. Robertson, psychiatrist at the University of Edinburgh, writing in the London *Times*. Animals may be divided into two mental classes, the "flat-faced" group,—men, tigers, lions and other cats, who have poor noses and good eyes,—and the "long-faced" group of dogs, horses, deer, rats and others, who have excellent senses of smell but poor eye-sight. The flat-faced individuals are "eye-minded" and the long-faced animals "think in smells", Professor Robertson believes. How the world appears to them can hardly be ascertained, he thinks, but probably their different outlook controls their habits and characteristics.

Cat to Rescue

When a mother leopard, with strange unnatural actions, tried to hide and abandon her baby, then finally dropped it in the watering trough in a shameful attempt to drown it, the authorities of the London Zoo, much perturbed, sent for a rat-catching tabby to raise the infant. Like the New England gossip, "she saw her duty and she did it", and both are now prospering. The excitement will come when the leopard grows, and the foster mother sees what a Gargantua she has raised.

Will C. Barnes

Just twenty-one years after entering the Forest Service, Will C. Barnes, Indian fighter, cattle-man, writer and musician, laid down his tasks as Chief of the Branch of Grazing Management, to assume the position of secretary to the United States Geographic Board. He had reached the retiring age, but he had not retired; instead he chose to add a new phase to a varied career. He won the Congressional Medal of Honor in the Apache Indian War by securing relief for his detachment through hostile Indian lines. He has been a stockman in Arizona who served on various cattle commissions and boards. In the Forest Service, he has been one of the first grazing experts, doing invaluable work in the conservation of range resources. Readers of Nature Magazine will remember him for the interesting articles he has written on its pages, and for the ones he is to write. Rangers will remember him as one who has played an extremely important part in the development of grazing management.



LOVELY WILD Flowers from the FAR WEST

Those who have enjoyed the lovely color pictures of the flowers of the Far West which have appeared from time to time in *Nature Magazine* and especially in the July number, and those others who have reveled in the beauty of the Western Flower Series in color in the National Geographic Magazine for May, 1927, will be pleased to know that many of the bulbs and plants therein described can be had in fine quality from a nursery which has specialized in that very thing for fifty years.

Thousands of Eastern people have successfully flowered my Erythroniums, Lilies, and Mariposa Tulips, and so can you.

"California's Choicest Bulbs", my beautifully illustrated catalogue, is yours for the asking. Postpaid.

CARL PURDY, Box 86
UKIAH CALIFORNIA

FRESH CALIFORNIA DATES
Direct From Our Garden

Know the true flavor and health value of PALM RIPENED DATES. Sweet with their natural sugar, healthful and wholesome. Absolutely clean and unprocessed. Soft dates 5 lbs. $2.50. Bread dates 5 lbs. $1.75. Assorted sample pkg. $1.00.

Delivery guaranteed prepaid, check or money order

GARDEN OF THE SETTING SUN
Dept. 11 Mecca, Calif.

California Native Trees and Shrubs
Will add beauty and charm to your garden. Read about them in our 50th anniversary catalog—copy sent free.
LEONARD COATES NURSERIES, San Jose, Calif.

TEN CACTI
Blooming size **All different**
Postpaid for $2.50
Table garden size $2.00
JAMES ALLAN
Mountain Park New Mexico

EVERGREEN SHRUBS
Fine Specimens for Home Landscaping
Rhododendron Max. Rose Bay Great Laurel. 2½ to 4 ft. Select clumps, 10 for $8.00; per 100, $65.00. Kalmia Mountain Laurel, 2½ to 3½ ft. Select clumps, 10 for $7.50; per 100, $55.00. Well packed for shipment. Cash please.
Write for car lot prices.
Rhododendron Supply Co., Doeville, Tenn.

Oregon Wild Shrubs
OREGON holly grape, Salal, Incense shrub, Ocean spray, Red huckleberry, Thimbleberry, Salmonberry, Snowberry, Red-berried elder. Small, 50c; large, $1 each. Well-rooted. Orders of $5 or more prepaid.
IRIS ACRES MOLALLA, OREGON

Now is the time to order your Christmas Gifts. Answer Nature Magazine Advertising

New National Forest

The Huron National Forest, Michigan, with an area of five hundred thousand acres, was created by the pen of President Coolidge last July, and the Department of Agriculture is proceeding with plans for purchasing the three hundred thousand acres still privately owned. Part of the lands formerly within the Michigan National Forest were transferred to this new tract. While much of the timber in the new possession has been cut off, extensive reforestation measures are to be taken.

Tularemia—A Lesson

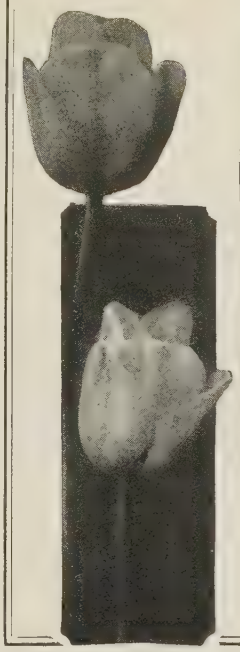
Until a few years ago the idea of bringing rabbits from the West to the East would have seemed the height of folly. Yet this has come to be the custom. So eager have been our hunters to kill the last wild rabbit during the fall that even the few to replenish the woods for the next season could not be spared. And so from the plains of Kansas and Colorado have been shipped thousands of cottontails, in order that our sportsmen, having stripped the covers, might again have their sport. Protests from Nature-lovers and others who dislike to see our birds and mammals exterminated, and then replaced by alien races, have been ignored. But we once heard a wise old man declare: "Experience is a dear teacher, but fools will have no other". And a recent release from the Press Service of the United States Department of Agriculture leads us to hope that the needed experience may have been gained, at least in certain quarters. Let the department speak for itself:

"The danger of introducing wild rabbits from other States in an effort to build up the depleted supply of game, rather than allowing the native stock to recruit its ranks by the help of proper conservation methods, is forcibly illustrated by recent developments in Massachusetts, where prompt action by the State department of conservation resulted in the detection of tularemia in a shipment of cottontails from the West, and their total destruction. By this salutary action the introduction of this disease into New England was averted and a lesson emphasized that is of vital importance to all individuals and organizations in any way interested in our native fauna.

"Investigations carried on by the United States Public Health Service and the Biological Survey have demonstrated the fact that the bacterial disease 'tularemia' is especially prevalent in wild rabbits. These animals, in common with some other species, serve as reservoirs from which the disease is transmitted to other animals and to man by the bite of certain flies and ticks, the latter also carrying the organism through the winter and transmitting it through their eggs to the following generation.

"Tularemia was first detected in ground squirrels in Tulare County, Calif., in 1910, and in 1919, in Utah, was definitely established as the source of a disease of human beings that had been long known under various names, including deer-fly fever, and which was frequently fatal. Within the past few years more than 500 cases of tularemia in man, with about 20 fatalities, have come to the notice of physicians. The disease is often contracted by cutting up the bodies of

Extra Quality Flower Bulbs



Bassi's Bulbs mean "*Excellence with Economy.*"

SPECIAL OFFER	We make the following special prices, for immediate delivery.
100 DARWIN TULIPS	Per 1000
Grand Assortment made from named sorts. Special	$2.75 $25.00

SPRING HARBINGERS

Delightful little gems for edgings, Rock Gardens, etc.
Chionodoxa (Glory of the Snow)
Eranthis (Winter Aconite)
Grape Hyacinths (Heavenly Blue)
Snowdrops (Single)
Scilla Campanulata (Blue)
Any of the above, doz., 40c. 100, $3.00.
100 Crocus mixed, $2.50

BORDER COLLECTION OF MAY-FLOWERING TULIPS

	Doz.	100
Bartigon (Darwin) Scarlet	$.60	$4.00
Bronze Queen (Breeder) Bronze	.60	4.75
Baronne de La Tonnaye (Darwin) Rosy Pink	.50	3.75
Clara Butt (Darwin) Pink	.50	3.75
Farncombe Sanders (Darwin) Red	.55	4.00
Inglescombe Yellow (Cottage)	.60	4.25
King Harold (Darwin) Deep Red	.55	4.00
Pride of Haarlem (Darwin) Rose	.50	3.75
Rev. Ewbank (Darwin) Lilac	.60	4.50
The Sultan (Darwin) Black	.50	3.75

SPECIAL COLLECTIONS

1 doz. of each of the above Splendid Tulips (Value $5.50) for $5.00
100 of each of the above Splendid Tulips (Value $40.50) for $38.00
(25 and 50 of each at the 100 rate—all first size bulbs sure to bloom)

NOTE: You may deduct 5% if you send cash with order

Complete Autumn Catalog of Bulbs and Plants, mailed Free upon request.

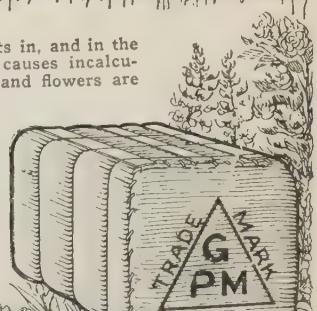
Bassi Frères Inc de Paris (*Established 1905*)

Seedsmen, Nurserymen
480 MAIN ST.
NEW ROCHELLE, N. Y.

Stop Winter-Killing of Prized Plants

DURING the late Fall before permanent cold weather sets in, and in the early Spring, alternate freezing and thawing weather causes incalculable damage by killing plant roots. Many prized plants and flowers are killed or permanently injured in this way.

But you can prevent it. Blanket your garden with a winter mulch of "G P M" Peat Moss. It's the only way. Then in the Spring turn the "G P M" under in place of manure. It is cheaper and much more satisfactory—and you will have a better garden. Let us tell you more about this Granulated Peat Moss (trade marked "G P M") now before the damage is done.



ATKINS & DURBROW, Inc.
E-25 Burling Slip, New York

CACTI CACTI

10 new variety large specimens, for only $2.50. Express charges collect. This collection includes the rare cactus *O. Ursinus*, and *Burbank Spineless* and other rare cacti, all different from last season's collection, and you will appreciate them. We will include one dozen assorted bowls hand decorated for only $3.50 and give you free one large 12-inch bowl if ordered all at once with above special offer. Seven new colored Desert Ferns $1.00 postpaid. Small Navajo Rugs only $10.00 postpaid. Get our illustrated Catalogue with package mixed cacti seeds 25c. Terms cash with all orders. No C.O.D. Rush your orders for the Holidays and get Souvenir FREE.

DESERT PLANT CO.
Station A., Box 95 EL PASO, TEXAS

30 Cactus 10c

Cactus make most interesting house plants, extremely odd and curious, and many have gorgeous and beautiful blossoms, sweet scented, and bloom profusely. These oddest of all plants grow in many shapes and sizes, are easily grown, thrive and bloom with very little care, and endure the heat and dryness of the ordinary living room. Much pleasure may be derived in growing them from seed.

Everyone is delighted and surprised at the odd appearance of a Cactus just sprouting. If you desire a fine collection of rare varieties, sow the seed in pots or boxes in a warm room in moist sand, and the seed will grow quickly. We have fresh seed of a mixture of 30 choice varieties. Cultural directions sent with each packet of seed. Sow seed in the house now.

Packet 10c; 3 pkts. 25c, postpaid.
Special Offer One Cactus plant, 50c; 3 for $1.00; 7 for $2.00.

BURGESS SEED & PLANT CO.
340 C. P., Galesburg, Mich.

Write For Bulletins on Growing Peonies and Bulbs

The Perfect Weathervane

(Patent applied for)

Built to endure for years. All parts excepting ball bearings and rod are of aluminum (won't rust). They are light, sensitive and mechanically perfect. Furnished with base, screws, N & S compass points. All parts adjustable. Finished dull black. Other unusual and pleasing designs of generous sizes at $10 to $40 each.

An Old Fashioned Garden 16" high x 30" long—Price $25.00. F.O.B. Norristown, Pa.

METAL SILHOUETTES

"FLYING OWL" 18" high x 22" wide $9.00 postpaid

Cut out of non-rusting metal. They are reversible, painted black, and ready to attach to surface of chimney, gable, over doorways, fireplaces, etc. Other Marine, Bird, Animal, Dancing Girl, etc. Designs, $7.50 to $25 each.

UNIQUE FOOT SCRAPERS

No. 111, Squirrel, 10" high

We are the originators of Animal Scrapers. All designs are copyrighted. They are cut of iron, carefully milled and finished black. All ready to attach to brick, stone or wood where they will prove to be a durable and welcome addition to any home. Other designs.

$6.50 per pair or $3.50 singly. Postpaid

Send for circular of other attractive articles and testimonials of pleased customers.

No. 108, Scotch Terrier, 8" high

No. 112, Social Cat, 10" high

HOUSEHOLD PATENT CO.
(The House of Quality)
100 Franklin Ave. Norristown, Pa.

Preferred by outdoor men!

NORTHLAND SKIS

Nearly all the world's best skiers use them. In quality, materials, design, and workmanship they're best. Look for the deerhead trademark. "How to Ski" booklet sent free.

NORTHLAND SKI MFG. CO.
82 Merriam Park, St. Paul, Minn.

Wild Flowers that need Protection

36 Beautiful Colored Postcards 25c per doz.

Seed for fall planting; 12 packets for $1.00. Trailing Arbutus fruits 25c or 5 for $1.00

Lectures on Wild Flowers, Orchids, Ferns & State flowers for rent or sale

Free Holly plant to new members on request for 30 days

WILD FLOWER PRESERVATION SOCIETY, Inc.

3740 Oliver St., Washington, D. C.

sick rabbits. This method of infection seems especially common in the Eastern States.

"It is obvious that the introduction of wild rabbits and other species of game from one part of the country to another may be at any time productive of consequences of the utmost gravity. Not only is there danger to the species directly concerned, but other valuable game and fur-bearing animals and game birds, and even man himself, may suffer serious illness or death, on a wholesale scale, as the result of a single introduction in itself unimportant from any standpoint".

Clothes Moths

The long-suffering husband who gets down his winter suit after a torrid summer, and loses his satisfaction at its fit on finding that moths have thoroughly digested certain portions, may find relief in the methods for moth control outlined in Farmers' Bulletin 1353-F, "Clothes Moths and Their Control", mailed on application by the Department of Agriculture. Dr. E. A. Back of the Bureau of Entomology, the author of this contribution to apartment house civilization, advises women's clubs and neighborhood organizations to pool their needs in the purchasing of the necessary insecticides for economy's sake.

Vicinity Sunday

A plan to supplement Old Home Week with a Vicinity Sunday, dedicated to the extolment of local natural beauty and the advancement of conservation ideas for the community, has been worked out by the First Baptist Church of Hamilton, N. Y., at which Rev. Franklin D. Elmer is pastor, and its success leads us to offer it as a possible project for other communities to encourage. The least it will do is to foster local pride in surroundings which, no matter how little scenic, must have some attractive features.

Refreshment Stands

Of special interest in connection with the Outdoor Good Manners and Roadside Beautification movement is the organization of the National Standowners' Association. This organization, which has as its official organ a little publication known as *Roadside Refreshment Topics,* is dedicated both to the improvement of the roadside refreshment stand and the prosperity of its owner. It is a much-needed association. The tremendous business done annually by highway stands of all descriptions has come about in a most helter-skelter fashion. Much that is unsanitary, much that is outright hideous and deplorable has gone with this development. There is now a nation-wide revulsion of feeling against the poorly-conducted and unsightly roadside stand. This new Association, which has its headquarters at 1407 Eye St., N. W., Washington D. C., has dedicated itself to remedying the condition which has brought about this feeling. It has a large work to do in many directions.

ARTISTIC PORTRAIT ENLARGEMENTS only 98¢ each FROM ANY PHOTO or SNAP-SHOT SIZE 16 x 20 INCH

(or smaller if desired)

The usual price of this work is $5.00 but by taking advantage of this **Special Offer** you can get a beautiful life-like enlargement of that favorite picture of mother, dad, sweetheart, baby or any friend **for only 98 cents.**

SEND NO MONEY—Just mail us the photo—any size (Full figure, bust or group) and in about a week you will have your enlargement guaranteed never to fade. It comes to you C.O.D. On arrival pay postman 98c plus a few cents postage, or send one dollar cash with order and we pay postage. Money back if not delighted. You can send us your most treasured photograph, it will be returned to you unharmed.

FREE In order to advertise this remarkable offer we send free with every enlargement ordered, a **Highly-Glazed Hand Painted** miniature reproduction of the photo sent. These miniatures alone are worth the whole price charged for the enlargement. Take advantage of this really **Amazing Offer** and send your order today. **DO IT NOW.**

ALTON ART STUDIO, Dept. N.M.
5654 West Lake St., Chicago, Ill.

Please enlarge artistically the enclosed photo. Return enlargement and FREE Hand Painted miniature. C.O.D. 98c plus postage. (If $1.00 is enclosed you are to send postage paid.)

Check Size Wanted
☐ 16x20 in.
☐ 10x 16 in.
☐ 11x 14 in.
☐ 8 x 10 in.

Name_____

Address_____

Town_____ State_____

A Christmas Suggestion...

WILD ANIMAL PETS

by William Lovell Finley
author of "American Birds"
and Irene Finley

With over 80 half-tone illustrations

Will delight both old and young

"Wild Animal Pets" is a delightful story telling about the rare creatures that inhabit our forests.

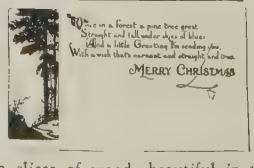
It is authoritative and instructive, as much of Mr. Finley's life has been spent in the wild studying its furred and feathered inhabitants.

In this pleasing story Mr. Finley makes each "little child of the woods" very human and every one who reads the book will certainly want to possess at least one of the animals as a pet. Which one, will depend on you!

Write now for your Christmas copy Only $3.00—*address*

BOOK SALES DEPARTMENT
1214 Sixteenth St., N. W., Washington, D. C.

Christmas Cards of WOOD

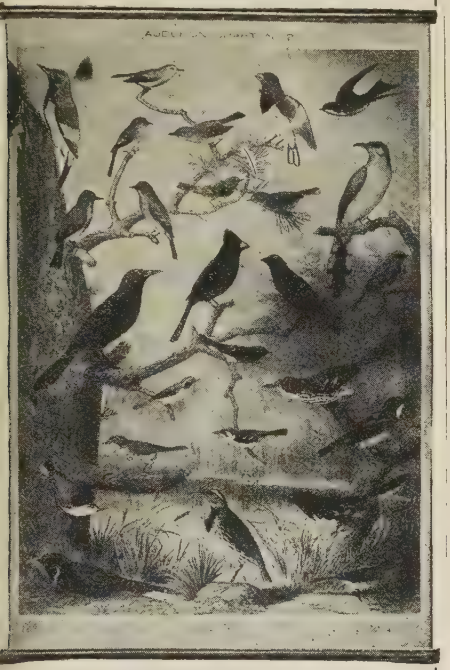


Thin slices of wood, beautiful in tint and texture, and carefully decorated.

Send $1.00 for sample set of five designs.

Romeyn B. Hough Co., LOWVILLE, NEW YORK

Audubon Bird Charts



Twenty-six Common Birds
(In Color)

Drawn by EDWARD KNOBEL
under the direction of RALPH HOFFMANN

The Birds pictured are as follows:

Red-winged Blackbird	Golden-crowned Kinglet
Bluebird	Robin
Bobolink	Chipping Sparrow
Catbird	Song Sparrow
Cedar Bird	Barn Swallow
Chickadee	Chimney Swift
Purple Finch	Scarlet Tanager
Flicker	Wood Thrush
Goldfinch	Red-eyed Vireo
Ruby-throated Humming-Bird	Black and White Warbler
Blue Jay	Yellow Warbler
Kingbird	Downy Woodpecker
Baltimore Oriole	House Wren

Interesting-Instructive

Awaken the interest of children in our common birds with these charts depicting the natural colored, life-sized birds in their characteristic attitudes. They are practical and helpful in all nature study and drawing.

Lithographed and mounted on cloth. Size 27 x 42 inches

For
Home Schoolroom Library

Four Beautiful Charts

Price $2.50 Each

AUDUBON BIRD CHARTS

1214 Sixteenth Street
Washington, D. C.

En Masse

In these days of vanishing woodcock, decimated deer, and zoo buffalo, it is quite marvellous to hear of animals so thick as to drive a man from work. Yet James T. Fullerton, of Port Townsend, Washington, writes of hundreds of humming birds who kept idle an electrician engaged in wiring a house near a lot filled with blooming kale. "They were as thick as bees", the electrician said in excuse for his stopping activities, "I was afraid one might put out my eye". Mr. Fullerton goes on to write in reminiscent tone:

"Twice before in my seventy-five years I have witnessed such phenomena. In 1875, on May 25, I went up to a marsh east of Winnipeg to hunt geese. The Arctic goose in that country was called the "plain wavey" because they gathered on the plains of Minnesota before starting their flight to York Factory on Hudson Bay. My half-breed neighbor came to my house and told me to come as the 'waveys were flying. We reached the marsh about 10 p. m. and the next morning the sky for miles was covered with lines of geese. All at once the wind shifted to the northeast and it began to snow. Within an hour that marsh was covered over its twenty miles square, as far as the eye could reach, with snow geese and they kept lighting all day, thousands upon thousands. The noise was deafening and when we shot they rose in clouds. The next morning at sunrise they all started again for the north and in an hour not one was to be seen. In the fall of 1890 we were living on a ridge adjoining a large swamp in northern Minnesota. Our well was near the swamp and on going for water one morning I saw some birds that at first glance I took for blackbirds all along the edge of the swamp where the cattle had eaten till it got too boggy. As I stooped for water one arose with a familiar 'scape' and on looking again I saw that the whole ground for a mile along the swamp was alive with snipe, *Scolopax wilsonii*. Rushing to the house for my gun I began the biggest hunt of snipe probably ever recorded. I went in to breakfast and returned to the swamp as soon as I had eaten. Not a snipe was to be seen".

Christopher Robin

Recently Howard H. Cleaves received an urgent plea for advice from Miss Lois H. Cobb of Albany and hastened to rush to her assistance. The whyfore of this plea is best set forth in Miss Cobb's own words with which she appealed to Mr. Cleaves, writing:

"We've adopted an orphan. In spite of all my Columbia training in infant care and child psychology, we are in a quandary as to just what habits should be established and how to establish them. So I am writing for advice.

"The baby's name is Christopher Round Robin—won because he stretches himself up on two wobbly legs and puffs himself out into a round feathery ball. I hesitate to conjecture his age, but he's well feathered out except under his wings, where he's 'in the nude'.

"We came by him honestly and perhaps

ZULU BLOW GUN

"Say! This is a real game"—Lookit her go —I'll betcha that one went 200 feet." That's the verdict of Young America on Zulu Blow Guns. And they're safe, that's why so many Boy Scout Troops use them.

No Other Game Like It!

Centuries ago the African tribes, the American Iroquois and Cherokees used Blow Guns. It's an old sport made new by Zulu. Children's lungs are developed by blowing, and at the same time every boy and girl wants one. There are two sizes, No. 1 with 3-foot gun, and No. 11 with 2-foot gun —both are complete with arrows and targets.

$1 and **$2**

One of the *"Family of Famous Boys"*

ZULU GAMES

This is a game based on the actual experiences of the most famous boy in America. Imagine the fun and thrills to be with David in Greenland—Icebergs, walruses, polar bears, Aurora Borealis, no end of adventures. Follow the route David took. Its easy to learn and lots of fun to play. The board opened is 17¾x18 inches, with checkerboard back.

There are 39 other famous Zulu Games.

Go to your dealer—if he can't supply you, SEND COUPON.

Zulu Toy Mfg. Co., 53 Barney Ave., Battle Creek, Mich.

Enclosed is P. O. Money Order / Express Money Order for $.....

Please send me.....sets of Zulu Blow Guns with the understanding that this money will be refunded if not satisfactory. Add 25 cents for postage. ☐ No. 1, with 3-foot Gun, $2; ☐ No. 11, with 2-ft. Gun, $1. ☐ David Goes to Greenland, $1.

Name .....

Address .....

City ..... *State* .....

Wonderful Lecture on Wild Life

Camera Hunting on the Continental Divide

with

Thrilling Moving Pictures

by

WILLIAM L. FINLEY

Famous Explorer and Lecturer

who made this remarkable picture on the recent Pack-Finley expedition under the auspices of the American Nature Association, has consented to lecture with it personally during the season

Feb. 15 to May 1, 1929

All who have seen the Finley pictures in the past will agree that this is the best yet

You who have read the story of the expedition, appearing in Nature Magazine for January, February, March, July, and September, 1928, will be more than ever eager to see this picture and hear Mr. Finley.

Rocky Mountain Goats—photographed in the wild from within fifty feet
Beaver—actually photographed in the wild while building a dam
Rocky Mountain Bighorn Sheep
Pronghorn Antelope—photographed from a pursuing automobile at 45 miles an hour
Moose, Elk, Mule Deer, Bears, Marmots

An ideal feature for the winter program of Hunting and Fishing Clubs, City Clubs, Nature Clubs; and absolutely unique as a private entertainment.

Some of Mr. Finley's engagements include: Boston City Club; American Museum of Natural History; Field Museum of Natural History; Columbia University; Indiana University; Universities of Illinois, Minnesota, California, and Oregon; Camp Fire Clubs of New York and Chicago; City Club of Milwaukee; Westmoreland Club; Worcester Club; Carnegie Institute; Pittsburgh Academy of Science and Art; Detroit Athletic Club; Advertising-Selling League, Omaha, Nebraska; Bruner Bird Club, Lincoln, Nebraska; Philadelphia Academy of Natural Sciences; Women's Clubs of Erie, Pa., Haverhill, Mass., Toledo, Ohio, and St. Louis, Mo.; St. Paul Institute; Women's Literary Union, Portland, Me.; American Game Protective Association; Buffalo Society of Natural Sciences; various Chapters of the Izaak Walton League of America; Public Museum, Milwaukee; various Boy Scout organizations; Edison Club, Chicago; Audubon Societies of Massachusetts, Ohio, and Illinois; National Association of Audubon Societies; Hartford Bird Study Club; Saint Mary's School, Peekskill, New York; University Clubs of Detroit, Buffalo, and Cleveland; Philips Exeter Academy; Bowdoin College; Brook's Club of New Bedford; Toledo Chamber of Commerce; Miss Chapin's School, New York City; The Lawrence School, Long Island, New York.

Dates for the coming season should be arranged as soon as possible by addressing

EXTENSION DEPARTMENT

AMERICAN NATURE ASSOCIATION
15 Boudinot Street, Princeton, New Jersey

lawfully. Sister found him Monday, cold and half starved, with his dead baby brother or sister, near the street in front of our house. We warmed him, fed him hard boiled egg yolk and angleworms, and tried to make him feel less forlorn. He has thrived under the care and yesterday we graduated him from basket to bird cage. He can now hang onto a perch and flutter down. We take him out on the lawn as often each day as we have time for, and here is when and where we need advice! How does one teach a young robin to scratch and find food? His I. Q. in that respect is about on the level of idiocy. He *won't peck*. He simply holds his mouth open persistently and intermittently for food! Now, we'd like to train the child to be independent in this matter of obtaining a livelihood. Also, we feel that he will be socially ill at ease with other birds when he is able to care for himself and we let him go. Can you suggest a remedy? Please don't delay the advice, for so much depends on early training, you know".

Almost before Mr. Cleaves could make helpful suggestions as to the proper rearing of Christopher, the young fellow was making out quite well for himself. A later report from Miss Cobb announced that "Christopher's mentality is developing quite rapidly, considering that he has to rely for assistance on such inadequately-trained mortals as are in this family. He's beginning to show interest in an angleworm squirming in front of him on the ground. . . . The funniest thing of all is to see him down a large angleworm. Christopher swallows, almost chokes, stops to regain composure and breath. Angleworm wriggles out of his bill; Christopher becomes alarmed, gulps manfully several times; and finally, with one last desperate wriggle, the worm disappears. Christopher —gorged but complacent—settles down to the business of digestion."

A Nature Resort

When the Dixie dam is built across White River, Arkansas, it will form a lake twenty-five miles long, and make another beauty spot in the Ozarks. The waters of this lake will come within a mile or two of the 126 acre estate of Gus Schade, a reader of Nature Magazine, who is looking for a partner to help him develop his ownings into a Nature resort, where quiet and beauty can be obtained. A big spring flowing one hundred inches of water is on the property, and a Federal Highway runs nearby. Mr. Schade hopes also to introduce to his mountain resort Brown Swiss cattle, which should do well in the rough and unbroken country. His address at present is 534 East 19th Street, Long Beach, California.

Nature Magazine's Prosperity Will Be Assured If Readers Answer Its Advertisements

DEVELOP POWER

AT HOME

to *initiate, persevere, achieve;* carry on through life your education; earn credit toward a Bachelor degree, by using the 450 courses

The University of Chicago

Gives by Correspondence

Inquire or check the adv. to show desire and mail to **323 Ellis Hall,** University of Chicago, Chicago, Ill.

BECOME A LANDSCAPE ARCHITECT

Dignified, exclusive profession. Little competition. $5,000 to $10,000 incomes for experts. Easy to master under our correspondence methods. Assistance extended to students and graduates. Write today for full details.

American Landscape School, 83, Newark, New York

Pathfinder TRIAL

EVERY WEEK **13 WEEKS**
$1 A YEAR **15 CENTS**

Your neighbors know the Pathfinder and you will like it--the every-week news digest from the Nation's Center. Bright, interesting, dependable, different--nothing else like it. Washington gossip, politics, science, travel, fun, lots of pictures, instruction, entertainment. Trial 13 weeks--13 big issues--**only 15 Cents.** or **$1** for full year. Send now. Address:

Pathfinder, Dept. 7 Washington, D.C.

Boys-Girls
Earn Xmas Dollars

Send for 50 sets Christmas Seals. Sell 10c a set. Send us $3, keep $2. FREE gifts for promptness.

NEW YORK PREMIUM HOUSE
296-R Broadway New York

CHRISTMAS CARDS FOR HAND COLORING

UNUSUAL DESIGNS BY LEADING ARTISTS

25 Charming Christmas cards with envelopes to match. All different. **$1.00**

86 Special X-Mas cards and folders, envelopes to match. All different. **$3.00**

Such cards should sell for 10 cents each and up when colored. Many are earning extra Christmas money doing it. Send for assortment now.

Canterbury Art Guild, 739 Boylston St., Suite 5, Boston, Mass.
An international organization of artists and craftsmen.
Catalogue showing many designs on request.

MAGIC
Learn at Home—by Mail! Easily! Quickly!

New! Different! Teaches you Big Tricks, Illusions, Stage Stunts, "Patter" and the Principles of Magic. Learn at home. Earn $250 to $1,000 a month. Write today for big *free* Magic Book.

TARBELL SYSTEM, INC.
1926 Sunnyside Ave. Studio 16-78
Chicago, Illinois

EARN $25 WEEKLY —SPARE TIME— This Book FREE!

How To Write for Pay

Write short stories and news items for magazines and newspapers. Experience unnecessary. Write today for FREE details and valuable copyright book.

PRESS INSTITUTE. 1268 ST. LOUIS, MO.

LEARN **ART** AT HOME **EARN MONEY**

Our amazing new method of Oil Painting Portraits, Landscapes, Miniatures, etc., requires no experience. PAINTING OUTFIT and Employment Service FREE. Write for booklet. PICTORIAL ART STUDIOS, INC., Dept. EN 2926 Broadway, Chicago.

HARRIS TWEED

Direct from makers. Ideal sporting material. Any length cut. Samples free.

NEWALL 467 Stornoway, Scotland

THIS CLASS PIN 30c.

If you buy 12 or more. Silver plate. Singly 40c ea. choice of 2 colors enamel, 3 letters & date. Sterling Silver, 12 or more 50c ea. Singly 60c ea. Big Free Cat. shows Emblems 25c to $8 ea.

685 METAL ARTS CO., Inc., 872 Portland Ave., Rochester, N.Y.

Nature Education

(Continued from page 331)

look into them. Public health officials find that education of the public is almost as important from a social standpoint as is research. The easiest thing to believe is not always the most truthful thing and individuals cannot vote intelligently on problems of which they know nothing. How many readers of this page could, for example, vote intelligently on an issue concerned with the cause of "grubbiness" in black bass? Am I right when I say that the story is as follows? A tapeworm in the intestines of an adult bass frees itself into the water. It mates and lays eggs. These hatch and the young attack a water-flea and develop for a period. The "flea" is eaten by a young bass or other small fish and the parasite enters the liver, spleen or reproductive organs of the young fish. It remains there until the host is eaten by an adult bass when the parasite develops into the mature tapeworm and lives in the intestines of the bass. Not one-tenth of one percent of the voters this fall could vote fairly on whether or not this is so and yet there are thousands who will vote on issues on which they have as little knowledge of the fundamental facts. Surely there are many things that cannot be determined with justice by political appointees or by majority votes and should not be tried to be so determined. Surely also there is ample evidence that there is great need for more Nature Education everywhere. Can't we put science into politics and keep politics out of science?

The Brightest Star

The brightest star in the heavens, if all the rays—heat, infra-red, ultra-violet—are considered, is Betelgeuse, the deep red star in Orion, according to Dr. Edison Pettit and Dr. Seth B. Nicholson, who have investigated for the Astronomical Society of the Pacific the ten brightest stars. Antares, the largest star ever measured, is second, while Sirius, that seems brightest to the naked eye, is third. Others, in descending order of brilliancy are: Canopus, Gamma Crucis, of the Southern Cross, Arcturus, Aldebaran, Capella, Mira, and Alpha Centauri, the star nearest the earth.

Centeter Attacks

An army of centeter flies, five thousand strong, attacked the devastating Japanese beetle in Harrisburg, Pennsylvania, this summer, and played havoc with his ranks. The flies were released by the State and Federal Departments of Agriculture and are parasites who lay their eggs on the thorax of the beetle. These eggs, on hatching, bore downward, causing death in from five to seven days.

Earn money AT HOME

Men or women earn $25 to $50 a week without leaving home. All or part time. Clean, fascinating work. Nothing to sell. We teach you at home and furnish all tools and materials.

ARTCRAFT STUDIOS, Dept. C
427 Diversey Parkway Chicago

Save Your Eyes

Dr. C. W. Trail says: *— "When I am not using the Farrington, my wife is using it; when my wife is not using it, our 8-year old daughter is using it. Every home should have at least one."*

At last—a Long Felt Human Want is Filled by this great necessity—Dr. Farrington's portable

Reading Table for the Lap

Conserves the Life of Your Eyes

Here is the helper you have always needed. It saves your eyes—conserves your energy—insures correct posture—prevents eyestrain—permits concentration with **real relaxation** and absolute comfort. The FARRINGTON supports books, magazines, reading matter, typewriter, writing materials, etc., **at just the right angle to insure correct vision,** regardless of position. It will help everyone who reads, writes, draws, etc.

IDEAL FOR CHILDREN

Don't let your child hump! It's dangerous! Eyestrain, distorted organs, curved spine and retardation of normal development results. The Farrington compels correct posture.

Students Delight In Its Use

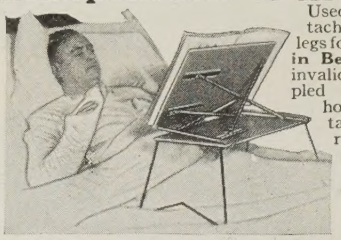
Prof. E.L. Eaton, University of Wis., says: *"It is a joy to read a book of any size, resting easily in a rocking chair. Thousands will now have a new joy reading while resting."*

With the Farrington every one can increase their capacity for mental effort.

Sit right—read right—feel right

Think what this means! Comfort, enjoyment, greater mental and physical energies. Greater facility for the mechanics of reading and writing. **Genuine relaxation.** The Farrington allows you to assume a comfortable position when reading, writing, etc.

Indispensable to Invalids



Used with detachable metal legs for **Reading in Bed** by sick, invalid or crippled patient in home, hospital or sanitarium. Used on beach or in the camp for eating, cards, etc.

Ideal Gift Usable in so many ways, it will give many years of joyful service. Beautifully finished. Light weight (less than 48 ozs.) sturdily constructed, portable, folds to 1 inch. Size 12x18 inches. A handsome piece of furniture adjustable to any position.

Styles and Prepaid Prices

1. Students Model	$5.00
2. Natural Finish	6.50
3. Walnut Finish	7.50
4. Mahogany Finish	7.50
5. Genuine Walnut	9.50
6. Genuine Mahogany	9.50

FOLDED

Note: Special detachable legs for reading, writing or eating in bed as shown above $1.00 extra.

Order Now on 5 Days' Trial Just tell us the style desired. Your "Farrington" will be shipped promptly, prepaid everywhere in U.S.A. Use it for 5 days. If you're not delighted, we will refund your money. Just enclose your check or instruct us to ship C.O.D. **STATE STYLE DESIRED.**

The Farrington Company
21 W. Elm St.
Dept. 15
Chicago
Illinois

Bird Filling Stations

Patented July 13, 1926

Feed the birds *now* and have them with you all winter.

AUTOMATIC—IMPROVED

Suet always clean and accessible to last particle

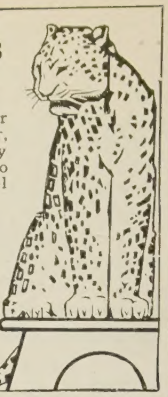
No. 1, price $1.50 For smallest home or largest estate. Every home should have several. **No. 2 price $1.25** For window casings, porch columns, etc.

No. 1 to hang from tree or bracket.

LEWIS P. KELLY

Dept. N. R. F. D. 4, Peoria, Ill.

For Christmas
Give a Fur Rug



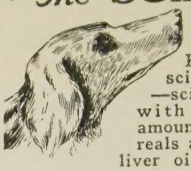
Many rare and fine Fur Rugs—of Royal Indian Tiger, Polar, Black and Grizzly Bear, Leopard, etc. Also Game Heads on new Panel mountings.

Write for a copy of our illustrated Art Catalog of Rugs, in color. Or our Game Trophy Catalog.

JONAS BROS.

1023 Broadway
Denver, Colo.

The SCIENTIFIC DOG FOOD



KEN-L-RATION is scientifically prepared—scientifically balanced with just the proper amount of pure meat, cereals and Norwegian cod liver oil.

Dealers everywhere sell it. In cans, ready to serve. Write us for FREE sample can.

CHAPPEL BROS., Inc.
1110 Peoples Avenue, Rockford, Ill.

KEN-L-RATION
THE DOG FOOD SUPREME

FEED the BIRDS

Use the **Packard Automatic Feeder.**

Keeps food dry, avoids waste, holds a quart, weighs (packed) 3 pounds, and costs $1 and **postage. Why pay more?**

Special Mixture Bird Food

Balanced ration. Nothing else like it: nothing else so good, 10 pounds. $2 and postage.

Everything For Wild Birds
Catalogue Free

WINTHROP PACKARD

1433 Washington Street Canton, Mass.

Always Rarin' to Go

Eyes sparkling, ears alert, a glistening coat and responsive muscles—keep your dog in perfect health with Miller's A-1 Dog Foods. Send ten cents for trial feedings and your copy of the "Pink of Condition".

BATTLE CREEK DOG FOOD CO.
1082 State St. Battle Creek, Mich.

FREE COPY SILVER FOX NEWS

Get the truth about the Silver Fox business. Helpful Hints and expert instructions for those who are in the business and those planning to go in.

Send for free copy or $1 for year's subscription. Issued quarterly. *Write Dept. L*

SILVER FOX NEWS
38 W. 34th St. New York

SCOTTISH TERRIERS

Beautiful young stock now ready for delivery. Price reasonable.

Loganbrae Kennels
Rutland, Vt.

GOLD FISH

Imported Japanese, Chinese and American Fish. Aquatic Plants, Castles, Food. We make artistic aquariums suitable for beautiful homes, conservatories, schools, etc. Illustrated circular free.

PIONEER GOLD FISH CO., Racine, Wis.

It's somebody's Birthday today
3 for $5.00 and Post Charges
Crescent Co. *"Birdville"* Toms River, N. J.

WHITE COLLIE pups the most beautiful specimens the dog world can offer, useful and intelligent. Send for Catalogue.

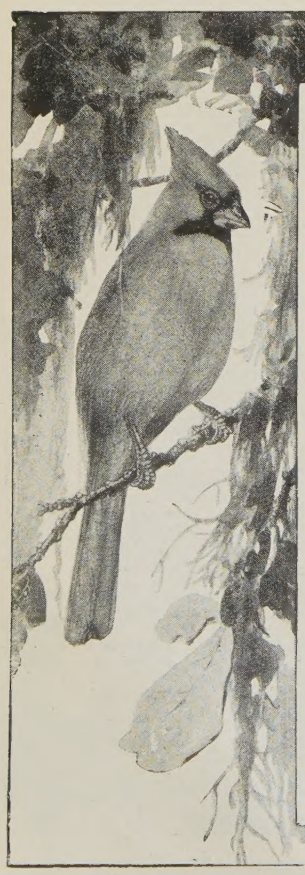
Comrade Farm Kennels, Galion, Ohio

BIRD AND ANIMAL PETS FOR CHRISTMAS GIFTS

Mention Nature Magazine in Purchasing Them

TWO FREE BOOKS

Breed squabs and make money. Sold by millions at higher prices than chickens. Write at once for two free books telling how to do it. One is 40 pages printed in colors, other 32 pages. Ask for books **three** and **four.** You will be surprised. **Plymouth Rock Squab Company, 704 H Street, Melrose Highlands, Massachusetts,** Established 28 years.



Membership Nomination Blank

AMERICAN NATURE ASSOCIATION *WASHINGTON, D. C.*

ANNUAL DUES	
United States	$3.00 a year
Canada	$3.25 a year
Abroad	$4.00 a year

....., 1928

Secretary, AMERICAN NATURE ASSOCIATION,
1214 16th St., N. W.,Washington, D. C.

I nominate for subscribing membership in the Association and to receive NATURE MAGAZINE:

.....

Address.....

.....

Name and address of
Nominating Member.....

.....

90% of the annual dues is designated for subscription to the magazine

The American Tree Association stands for a constructive policy of forest protection and extension, to increase appreciation of forests as natural resources essential to the sound economic future of the country.

The Association directs encouragement of tree planting by the public; disseminates popular forestry news for the information of editors of the daily press; and compiles and distributes forestry news and reports on legislative progress for assistance of active foresters in the field.

The American Tree Association

CHARLES LATHROP PACK
President

ARTHUR NEWTON PACK
Secretary

PERCIVAL S. RIDSDALE
Treasurer

RICHARD W. WESTWOOD
Assistant Secretary

RUSSELL T. EDWARDS
Educational Director

THE NEW building of the New York State Ranger School on Cranberry Lake in the Adirondacks was dedicated with appropriate ceremony on Aug. 24. The following day a conference on ranger school education was held in the new building. The two-day session was followed by a trip to the Charles Lathrop Pack Experimental Forest on the other side of the lake. Some of the foresters in the party then motored across the Adirondacks to the Charles Lathrop Pack Demonstration Forest near Warrensburg, N. Y.

Franklin Moon, dean of the New York State College of Forestry, opened the dedication program by pointing out that the new building is a dream that came true. The first class was graduated at the end of 1913 and by that time the long shed used as a temporary school building was replaced by the old dormitory which served as a dormitory, administration building and school until the end of the 1927 school year. The old dormitory will be removed within another year.

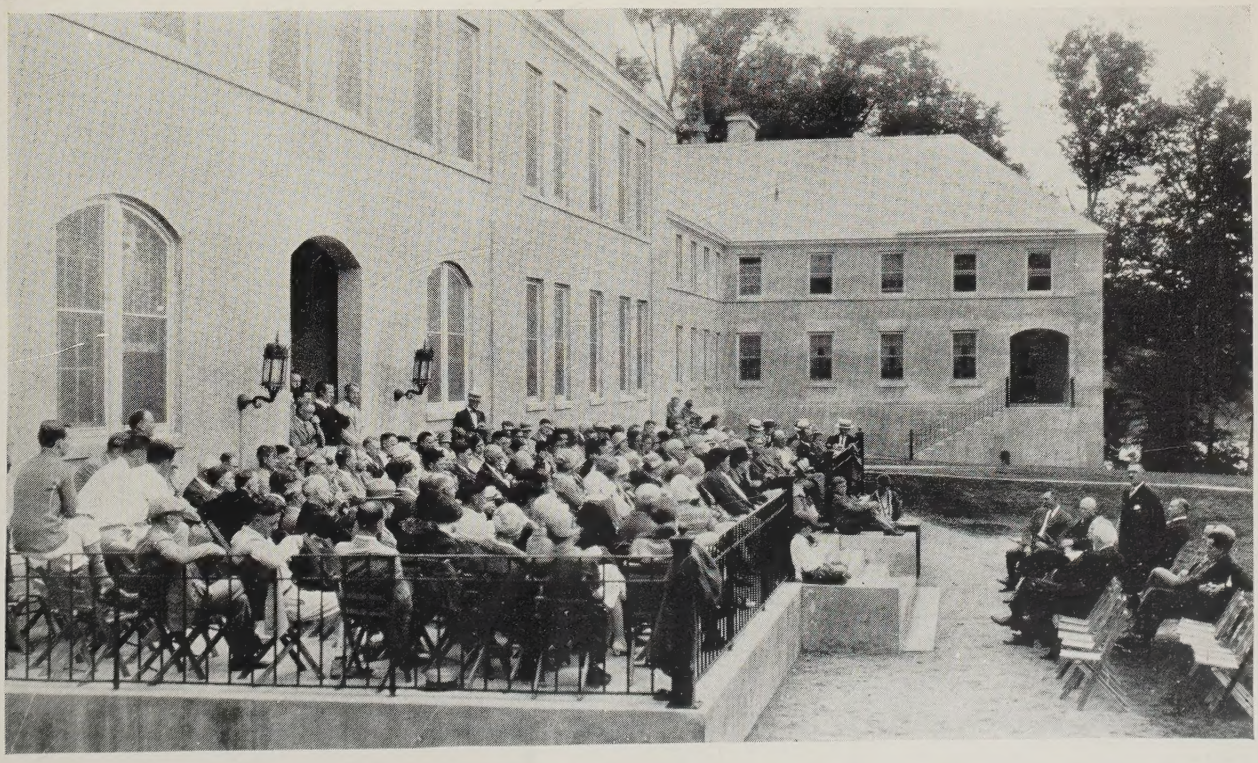
After outlining the history of the school Dean Moon introduced the Hon. Louis Marshall of the Board of Trustees of the College of Forestry, Charles W. Flint, chancellor of Syracuse University, Robert Craig, Jr. of the College of Forestry and Conservation of the University of Michigan, D. W. Rogers, who spoke for the Alumni, James F. Dubuar, the director of the school, and Henry S. Graves, dean of the School of Forestry at Yale.

In his address Mr. Marshall pointed to the fine co-operation between the faculty and the board of trustees and between the student body and the faculty. He added:

"This is a very happy day for those who are connected with the New York State College of Forestry and its various subdivisions. It is a day we have looked forward to,—the dedication and opening of this building. I may say on behalf of the Board that although we studied the plans and expected to have a very useful building, when we came here today we had no idea that there was not only the utility but also the beauty of structure. I think there are congratulations to be extended on this occasion, first to the Chancellor of Syracuse University, Dr. Flint, then to the Dean of the College of Forestry, Prof. Moon, then to Mr. Dubuar, Director of the School, who has made of it a living institution, a useful institution to the people of the State of New York who have made adequate appropriation for it, and who will be the principal beneficiaries. The seed sown here and the work done in this institution will, I hope, go on for centuries to come.

"The College of Forestry is a young institution and today it has not only grown into two camps, but into many camps, and its work has extended into practically every part of the domain of forestry. We have the College at Syracuse, we have this Ranger School, we have the Roosevelt Wild Life Experiment Station, we have the forest on Cranberry Lake through the generosity of Mr. Pack; we likewise have the forest show-window, a tract of land of 2000 acres which is destined to fulfill a great part in the education of the public in forestry. No efforts have been spared to make every one of these departments successful and we owe a great debt of gratitude to those who have been connected with the faculty and with the institution, and we also owe a debt to our alumni and to our student body."

Chancellor Flint spoke of the great work in forestry education the state is doing and Dean Graves pointed out the important part the Ranger School had played and would play in its field of forest education. Then followed the very instructive conference on Ranger School education at which Dean Graves was the presiding officer. The dedication program was followed by a dinner attended by the alumni and guests of the college.



Franklin Moon, Dean of the New York State College of Forestry, opening the program which dedicated the new building of the New York State Ranger School on Cranberry Lake. The exercises were held in front of the new building and facing one of the most beautiful views in the Adirondacks.

It's all they say it is — and more!

ANSWERS the purpose of b
pen and pencil combined!
Actually improves your ha
writing!
Writes freely and easily withou
miss, skip or blur!
Never blots, balks, dries
scratches, leaks or soils han
Writes equally well on rough
smooth paper!
Wonderful for making carb
copies with original in ink!
Draws lines to a ruler with
smear or smudge!
That's what thousands of sa
fied Inkograph users say. Ma
tell us it is the best writing
strument they have ever us
regardless of price. Unlike
fountain pen, anyone can use y
Inkograph without fear of spread
or injuring its 14-kt. solid g
point.

*Take advantage of our free 10 day t
offer and test the most satisfact
writing instrument you have ever us*

SAME SIZE AS $7 & $8.75 FOUNTAIN PENS

ONLY $1.50

$1,000 REWARD

to anybody who can prove that these testimonials were solicited by us.

Inkograph has proven so satisfactory and has elicited considerable favorable comment am enclosing money order, please send me three more. T. J. Trow, Traveling Claim Agent, Joplin, Mo..

The Inkograph fully justifies all claims you make. I own a Waterman but Inkograph is far preferable. Frank R. Sargent, Oakland, Calif.

You have one of the best writing instruments I ever used regardless of price, I use the lowest grade stationery and there is never a blotch or scratch because of it's round smooth point. It is a wonderful invention. H. L. Orley, Albano, Va.

Oh, boy, I am tickled skinny to have the Inkograph, it's a darling. I can now make carbon copies in taking orders and send originals in ink to factory instead of a penciled sheet. It surely flows over the paper as if it was grease instead of ink. No trouble at all and a thing I could not do before to trace straight lines very fine and clean. No smear, no muss of any kind. It's just great. E. A. Simms, Jersey City, N. J.

My Inkograph is the smoothest writing instrument with which I have ever written. That is saying a lot. I am a teacher by profession. I have a $7.00 pen and another that cost more than the Inkograph, but Inkograph is better than either. It is the greatest improvement in writing instruments since the Babylonians recorded their thoughts on clay tablets with a triangular pointed reed. John R. Atwell, Chadwick, N. C.

My Inkograph is the first and only writing utensil I ever owned that I can use with pleasure. To be without it for any time would upset my business day. It has always worked perfectly. I have never had any difficulty with it. Arthur L. Fox, Centerville, Mich.

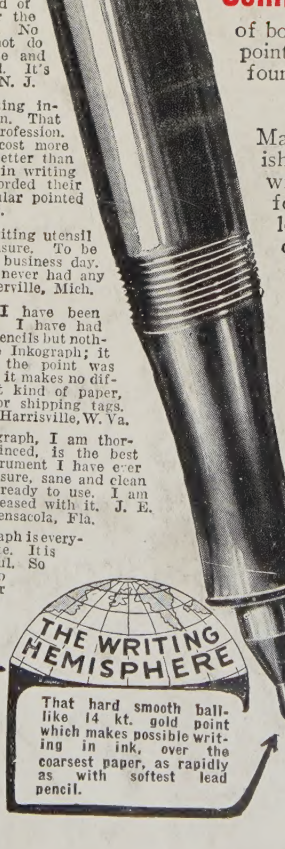
I am a bank teller, have used all kinds of fountain pens, but can honestly say for my work I never found a pen so easy and tireless to write. You can pick it up any time in any position and write immediately and all numbers and words will be the same. Try and do it with any other pen. My buddies all agree that it is best for our work. C. R. Morley, Allentown, Pa.

Delighted. It writes bully—you have invented a pen that is perfection. It is so much more rapid than my $9.00 fountain pen. I wish you abundant success. S. L. Carlton, Aurora, Ill.

I am very well pleased with my Inkograph. It is just what I have been looking for. I have had several ink pencils but nothing like the Inkograph; it writes like the point was greased and it makes no difference what kind of paper, it is fine for shipping tags. S. I. Jarrett, Harrisville, W. Va.

The Inkograph, I am thoroughly convinced, is the best writing instrument I have ever used. It is sure, sane and clean and always ready to use. I am very well pleased with it. J. E. Rampton, Pensacola, Fla.

Your Inkograph is everything you state. It is just wonderful. So send me two more. Arthur Olicott. Tucker, La.



That hard smooth ball-like 14 kt. gold point which makes possible writing in ink, over the coarsest paper, as rapidly as with softest lead pencil.

FREE 10 DAYS TRIAL

THE NEW IMPROVED

INKOGRAPH

"PENCIL POINTED PEN"

The Perfect Writing Instrument

PATENTED 1, 27, 1925

TRADEMARK Reg. U. S. Pat. Off.

Combines the Best Features

of both pen and pencil, minus the weak points of both, plus improvements not found in either.

A Pen of Refinement

Made of finest quality, highly polished, black fountain pen material, with 14-Kt. solid gold point and feed, safety screw cap, self-filling lever and clip. In workmanship, quality and appearance it is the equal of pens selling for a great deal more.

Cannot Leak

Not the tiniest drop of ink will spill, although one filling is sufficient to write thousands of words.

Patent Automatic Feed

prevents clogging. No complicated mec
anism to clean or get out of order.

Makes 3 to 4 Carbon Copie

at one time with original in ink. Bear down hard as you like, without fear of bending, spre
ing, injuring or distorting its 14-Kt. solid g
point.

Ideal for Salesmen's Orders, Private Correspo
ence, Office, Sales and Billing Records or a
work requiring exceptionally clear carbon copi

If Dissatisfied With Your Fountain P

—try the Inkograph, it's all we ask. If it d
not prove entirely satisfactory, is not handier a
superior, and does not write smoother than a
fountain pen you ever used, whether it cost $5,
$7, or $8, return it to us and we'll refund y
money.

INKOGRAPH CO., Inc., 199-871 Centre St., New York, N. Y

DEALERS Stationery Stores, Drug Stores, Department Stores, etc., send for our catalog and trade prices.

SEND NO MONEY

Your name and address are sufficient. Pay postman $1.50, p
postage on delivery. When remittance accompanies order, Inkogr
will be sent postage prepaid. If within ten days the Inkograph d
not prove satisfactory return it and we'll refund your money with
further correspondence. It is because we are sure the Inkograph
meet your requirements to perfection that makes it possible for
to make you so attractive an offer.

NOTE:

When remittance accompanies order, INKOGRAPH will be sent postage prepaid. If within 10 days it does not prove to be all we claim it to be—return it and we will refund your money immediately.

Mark X Here ☐

if you prefer ladies' size with ring on cap to be carried on ladies' sautoir or men's watch chain.

INKOGRAPH CO., Inc.,
199-871 Centre St., New York, N. Y.

Gentlemen: You may send me your Inkograph. I will pay postm
$1.50, plus postage on delivery.

Name .....

Address .....

City..... State.....

AGENTS

A big value which sells on sight. Writes smoothly and is handier than any fountain pen. Big profits, quick sales, no investment, no competition, quick commissions. Send for Inkograph and with it receive order book, so you can take orders at once, or write for FREE sales plan booklet.